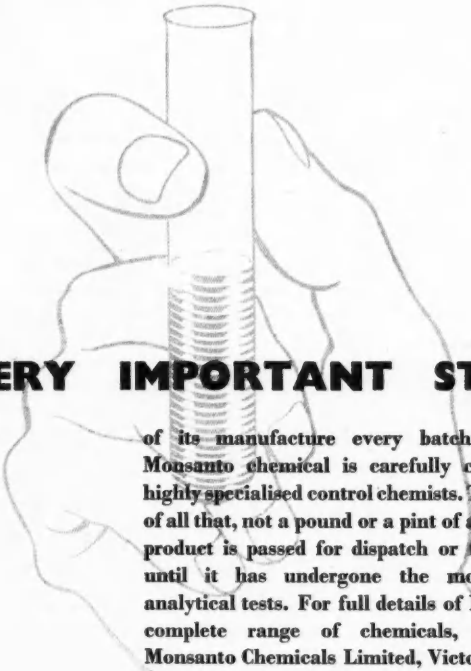
TECHNOLOGY DEPARTMENT
OCT 26 1948
DETROIT

CHEMICAL AGE

VOL LIX 9 OCTOBER 1948 No 1526



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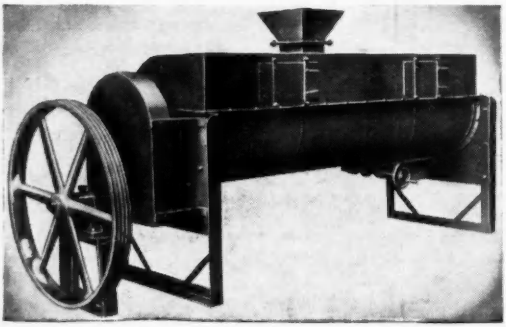

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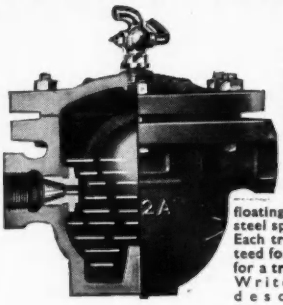

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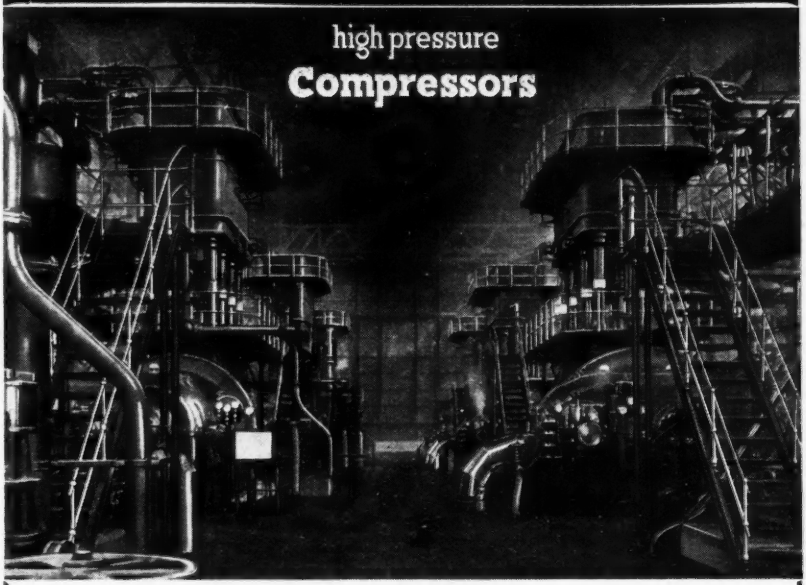

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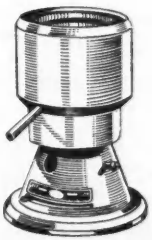

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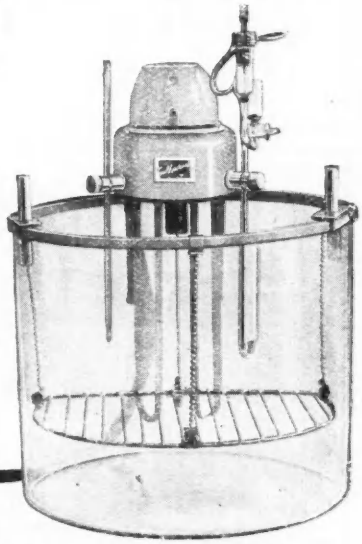

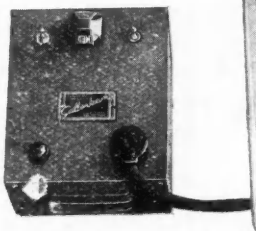

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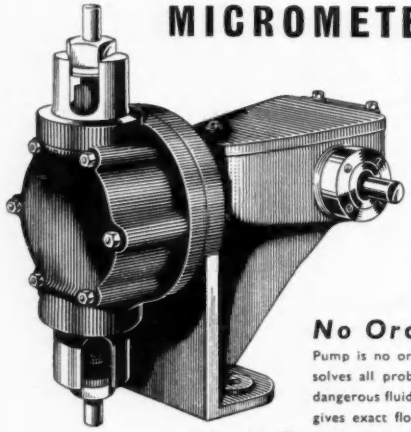

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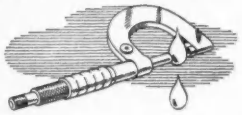

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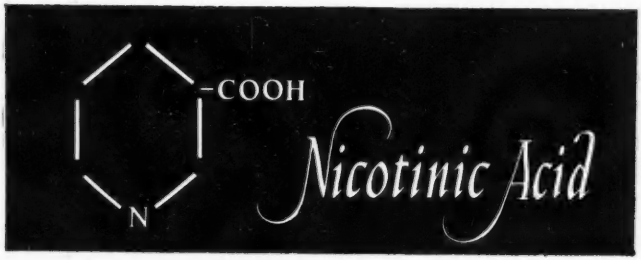

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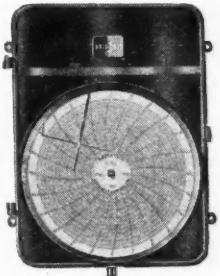

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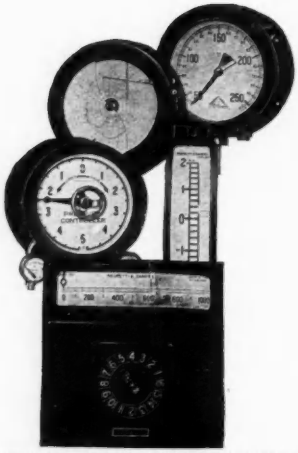

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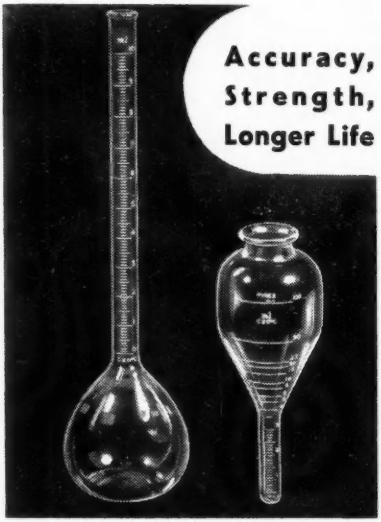

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Metalliferous Mining in Britain

ATTENTION has been called on numerous occasions to the heavy inroads that have been made during this historically brief industrial age on the world's known reserves of minerals. The British Association had something to say upon that theme, and it appears that it may be necessary to consider methods of conservation of metals and other rarer elements on the one hand, and to take every possible opportunity of efficiently mining all known reserves on the other. There are certain sources of materials which appear to be virtually inexhaustible, but, excepting water and air and possibly some rocks such as limestone, it is difficult to name any that are likely in fact to prove adequate to meet the existing industrial demands for another two or three centuries. A time will come when scientists will have to review what sources of raw materials remain, and direct their work to securing the essentials of daily life using those substances as starting points. Life would be very different had we no steelworks, no non-ferrous metals to speak of, no coal mines, no petroleum, as may well be the case 1000 years from now: and many other materials on which we now rely may well have failed us long before then. We can be sure of water, or air, of rocks beneath the surface of the earth. Silica and a few other oxides will always be available; but whether we can extract other useful compounds at a reasonable cost is another matter. Chemistry, therefore, may well be devoted in the future to devising new materials from those that will remain abundant and to perfecting efficient and not too costly methods of isolating such elements as we cannot do without from rocks in which they are contained in very small amount, or from the sea.

It is doubtful if local government authorities in Britain have made any extended study of this problem. They may be actuated by a laudable sense of patriotism, of helping the country to produce at home things for which we must now pay in foreign currency. They are fairly certainly glad to see a chance of adding to the rateable value of their districts in order to finance schemes of social betterment. Whatever are the motives, there has lately been renewed activity of this kind, including the announcement that local authorities in Derbyshire are now pressing the Government to sponsor new mining ventures. The local enthusiasts, remembering the county's lead lodes and its past history of mining, take the view that there is still a great deal of unmined lead in Derbyshire.

Basically, the idea should appeal to the theoretical economist; if lead is present in any considerable quantity in this country, let us be active in getting it. In practice, the idea requires careful consideration. We have seen certain outstanding examples of the widespread desecration wrought by Ministers of Fuel and Power in their plans

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for open-cast mining of coal, much of which is pretty poor stuff. We should not like to let loose any Government production department on the beauty-spots of the country; it is almost axiomatic that metalliferous veins are prone to occur in places of great natural beauty. It is nevertheless worth while making a careful examination of the possibilities still remaining. How much lead is still unmined? Are there derelict mines that could yield reasonable quantities of metal? Are there veins yet untapped that could be worked profitably? These are questions that require very careful examinaion before fresh workings are started.

One of the difficulties is that development in the past has been haphazard. Private enterprise on so small a scale is apt to be untidy. People dig a shaft and forget to fill it in. People die or become bankrupt and the hole is never filled in, nor is any record kept of where the hole was or why it was abandoned. Not only does this add to the economic difficulties of future mining, but it may be a very serious hazard of country life. Farmers in Derbyshire sometimes find lead mines all over the place, in any field, unknown to themselves or to past owners. This arises from the practice of sinking for lead anywhere under old laws, still unrevoked. These give to anyone the right to prospect where he wishes, except in public roads, private gardens, churchyards and orchards.

No farmer (it is suggested by a writer in the Autumn issue of *The Countryman*) could object under these laws, provided that enough lead to fill a "standard dish" could be got from the new mine within 14 days. If that condition was not fulfilled the mine had to be filled in again and the ground made good; these mines, filled in hastily by disgruntled men, seem to be the chief danger, though many of them are still preserved as mine shafts, a danger to the farmer and his stock. *The Countryman* records, for example, how one of these shafts in a field was walled off, but a heifer climbed over the wall and was never seen again. Here two lead mine shafts cleverly walled all the way down on the inside were originally descended by crude ladders, now long since mouldered into decay. When a stone is tossed down, an appreciable time elapses before it hits the bottom, then it rebounds and rebounds as if the shaft continued not vertically but at a steep angle. Other examples could be quoted of similar occurrences, indicating at once the many attempts made in the past to mine lead in Derbyshire and the haphazard way in which this development took place.

NOTES AND COMMENTS

Curtain Raisers

THE air-borne envoys of the Association of British Chemical Manufacturers, recently returned from Czechoslovakia, have brought back no backstage revelations of what goes on when almost every department of a country's chemical industry comes under State control. Or if they have they are too discreet and appreciative of the hospitality that was showered on them to permit a hint of criticism to enter the summary issued this week by the ABCM of collective impressions of what the reverse side of an iron curtain looks like. Perhaps the best indication of what may have been the general reaction to industrial conditions there is the almost studied avoidance of anything that could be construed as a verdict for or against Czechoslovakian political and economic policy. One thing they do make abundantly clear is the glowing cordiality of their reception wherever they went and which could, it seems, have been no warmer had they been emissaries from the Kremlin. One suspects, indeed, that it might in that case been several degrees cooler. The ABCM members are likely to have rendered a useful service in a field very much wider than that of chemical industry.

A Disappointing Document

THE note of optimism, sounded in this page last week, that scientific research in this country might be allowed to benefit from a portion of the current allocation of Marshall Aid funds, particularly so as to permit the importation of much needed equipment, has been muted by the Board of Trade. That is the effect of a Press note, issued last week. This indicates that the Board has received a number of what appear to us to be quite logical inquiries from importers as to the possibility of obtaining goods from the U.S.A. under the European Recovery Programme and the procedure that should be followed to obtain such imports. Then follows a statement of the position which the Government, using the controlling influence of the Board of Trade, intends to maintain, and there is no doubt left in the mind that it will be easier for the fully loaded biblical camel to pass through one of the smaller side gates into the city than for British scentific industries—or any other industries for that matter—to derive a real boon from the current ERP allocation. There will, the note sternly warns us, be no increment of what is afforded by the existing level of imports. Further reduction of imports may, indeed, still prove necessary if prices of raw materials and basic foodstuffs continue to rise. The following appears to be the nadir of this very negative and disappointing contribution to the production campaign. "Some importers appear to suppose that an import licence will be more readily granted if they can arrange for a transaction to be financed on ERP terms, but this is not the case. It is therefore unneccessary for firms to inquire whether goods in which they are interested are so financed or to recommend that they should be."

Preventing Industrial Emigration

PRACTICAL steps to ensure the establishment of electro-chemical and electro-metallurgical industries in the Scottish Highlands have lately been taken by the Scottish Council (Development and Industry). It has submitted to the Government a proposal whereby such industries will obtain the power they require at a cost sufficiently economical to permit them to compete with comparable industrial undertakings abroad. In recent estimates of the rates at which hydro-electric power will be supplied there has been a very marked upward tendency, dimming some of the hopes entertained of large and diversified industrial development, reminiscent of what was achieved in Italy. Negotiations with leading firms in these fields, stated Sir Steven Bilsland (chairman of the council), recently, had shown that there was an upper limit to the price for power beyond which establishment and successful operation of an industry could not be contemplated. The upward trend of costs of hydro-electric power—and his remarks were not meant to imply any criticism of the present hydro-electric scheme—now made it quite clear that something very definite would have to be done to ensure that such enterprises as had been mentioned remained in Great Britain, and did not go, for instance, to Norway, where

cheaper power was available. Should this plan of the Scottish Council mature, the industries which it is proposed to establish would doubtless provide acceptable quantities of raw materials for the plastics and other industries.

Post-Graduate Lectures

ARE chemists in general too restricted in their outlook or is the complaint confined to oil and colour chemists? The reflection is prompted by the relatively poor attendance at the lectures recently organised by the Oil and Colour Chemists' Association on the subject of "The Impact of Radioactivity on Inorganic Chemistry." Much better attendance was achieved at the series on "Chemical Aspects of Light" and on "Viscosity and Plasticity" in recent years. The avowed purpose of these lecture series, however, is to keep graduate chemists up-to-date in the latest developments in chemistry and its border regions. Judging by this year's attendance, the basic attitude seems to be that oil and colour chemists at least are interested only in those branches of science having direct application to the work in hand. If that is true it is a shortsighted policy. They are missing a very useful, authoritative and up-to-date review by Prof. Emeléus, F.R.S. Facilities for presentation of the material are uncommonly good, too; the technical facilities at the historic Lecture Theatre of the Royal Institution impress one afresh at each visit. It is one of the very few lecture theatres in which imaginative use is made of spotlights to rivet attention of the audience and even to underline the lecturer's points. Scientific discussion in these conditions has almost a dramatic quality.

Russia and Malaya

THE continuing disturbances in Malaya are having a serious effect on that country's economy, which is bound eventually to have unwelcome results in the traditional markets throughout the world. Production of rubber, tin and other commodities is being impeded by the widespread terror tactics to which the staffs of estates and mines in some areas are being subjected, and to some extent by the physical destruction of plant. A recent report by Mr. Paul Sykes, Canadian Government Trade Commissioner in Singapore, reveals significantly that the U.S.S.R. has lately appeared as one of the principal buyers of some of Malaya's most important products. In July, when the controversy over the quality and price of natural and synthetic rubber still showed no sign of abating, the U.S.S.R. was the biggest purchaser of Malayan natural rubber. The quantity involved was 36,813 tons, far in excess of purchases made by any other country. How important Russia is as a customer of Malaya is shown by the value of exports to that market in 1947—$28,438,110, compared with imports of $563,465. For the five months ending May, 1948, Malayan exports to Russia were worth $17,174,791 and imports $28,871. Malaya's exports to the U.S.S.R. are made up almost entirely of rubber.

Workshop Psychology

SERVING as a useful footnote to the reports of the ninth International Congress of Industrial Medicine (THE CHEMICAL AGE, September 25) the survey in the *Monthly Bulletin of the Ministry of Health* by Dr. Cecil Roberts, chief medical officer of the Post Office, one of the first concerns to organise its own industrial medical service, fully merits attention in a wider field than the GPO. In his report Dr. Roberts stresses the importance of the psychological atmosphere of work, health and sickness. He attributes the low amount of sickness among postal engineers to the fact that they are largely craftsmen, enjoying the satisfaction which that kind of employment confers, and that they work mainly in small, friendly groups in close contact with their immediate supervising officers. The physical side of their work, though frequently hard, is "more than offset by psychological factors conducive to *esprit de corps* and the influence this has in preventing any drift into sickness, absenteeism and valetudinarianism." Sickness rates, Dr. Roberts points out, are largely a measure of the state of the adaptation of the worker to his (or her) environment, and so become the concern not only of the doctor but of the personnel management as a whole.

Surplus Stock Sales.—Paints and chemicals held by the Ministry of Supply are to be auctioned at the MoS depot 164, Leicester East, on October 14.

MISSION TO CZECHOSLOVAKIA

Cordial Reception to ABCM Delegates

THE goodwill mission of the Association of British Chemical Manufacturers which went to Czechoslovakia at the invitation of the Czechoslovak nationalised chemical industries has returned with a kaleidoscope of memories, mostly happy and many of them quite unconnected with chemicals. Summarising the impressions of a motor trip of nearly 2000 miles and visits to eight chemical works, the ABCM records: "A memorable mission on which was showered everything that could contribute to its interest, comfort and well-being—unbelievable kindness, courtesy, hospitality and goodwill never to be forgotten."

Plants Visited

The report indicates that the English party missed little of the dramatic beauty of the country or of the scope of the extreme economic experiment in progress there. Among the principal chemical undertakings visited were the chemical factory at Novaky, which is to become the centre of the country's acetylene industry; the imposing dyestuffs works at Rybitvi and the rayon plant at Neratovice; the 100-year old soapworks at Schicht, "a model of construction and efficiency," and, largest of all, the Stalin works at Most, which the occupying Germans built to yield over one million gall. of motor spirit annually, a plan which the bombs of the RAF abruptly ended. It is now in course of being restored.

"Czechoslovakia"—says the ABCM summary—"is working hard to rebuild its economy. The nationalisation of the big industries and the banks in 1945 was the first step and was done with the general approval of the populace and apparently rightly so in the very special circumstances.

"Then in 1946, they embarked on a Two-Year Plan, primarily of reconstruction, to bring up productivity to about 10 per cent. over the 1937 level without serious capital expenditure, except in agricultural Slovakia, where a development scheme had to be pursued in the interests of that territory. This plan, now nearing its end, is claimed to have achieved its objectives, the chemical industry having exceeded its target by 8 per cent.

"Now a Five-Year Plan is being formulated and the details should be completed soon. The aim was said to be to increase consumption per head by about 60 per cent. as compared with pre-war and the national income by 40–50 per cent. In particular, the heavy machinery industry is due for the largest expansion of some 200 per cent. This is about three times what is planned for the chemical industry.

"For this plan, an addition of a quarter of a million workers to the present industrial force of 1.4 million is likely to be needed; this can come only from the land. Labour, and especially technical personnel, will be the main bottleneck. Hence their desire for technical collaboration with western Europe and especially the United Kingdom, with whom they desire to maintain the friendliest relations without affecting the arrangements thay have already made with eastern Europe.

"Czechoslovakia is short of sterling, and if this can be rectified there is a good market for British chemicals. ERP would have been a great help to the country but is still opposed, ostensibly for fear of American domination.

"With politics the mission had no concern and prefers to make no comments. The technical problems that have to be faced in the future will undoubtedly test the resources of the country. Without internal harmony the task may well prove incapable of accomplishment.

"The mission has returned full of goodwill for Czechoslovakia and of sympathy for her in the tasks that lie ahead."

Steel Nationalisation: Sir Stafford Cripps on "Security"

SPEAKING at a Press conference in New York on Tuesday, on the Government's attitude to steel nationalisation in the U.K., Sir Stafford Cripps said:—"We believe that both from a strategic and from an industrial point of view nationalisation will give us a greater security for the necessary supplies of steel at a reasonable cost." He indicated that free convertibility of sterling was not contemplated in the arrangements being worked out between British representatives and officials of the Economic Co-operation Administration, adding: "We have been proceeding on the basis of supplying the countries with the necessary currency in the different markets to enable them to obtain the goods."

In these negotiations Britain had offered to put up an equivalent of $500 million worth of goods during the present year, said Sir Stafford. That meant we were sending $500 million worth of exports for which there would be no return. Part would be a gift of sterling to Europe and part would be allowing European countries to draw against sterling balances accumulated since the war.

Glass Experts Confer.—Representatives from Belgium, Czechoslovakia, Denmark, France, Holland, Norway, Sweden, U.S.A., and the United Kingdom were among the 130 scientists and technologists who attended the joint meetings of the International Commission on Glass and the Society of Glass Technology at Sheffield and Buxton. Discussions dealt with the atomic structure and surface chemistry of glass.

Paper-making Developments

The Use of Synthetic Resin

FROM the time when the Chinese invented paper nearly two thousand years ago, there has been an almost ceaseless search for fresh fibrous raw materials, until the use of wood was introduced approximately 75 years ago.

A new technique of paper making has now been evolved under the comprehensive research programme of the U.S. National Bureau of Standards. The development of a synthetic resin, melamine formaldehyde, imparting unusual strength, enables many deciduous woods (such as maple, beech, birch, or poplar), which have formerly been considered only as "fillers," to be fully utilised.

Technically, paper is a felted sheeting of vegetable fibres, formed on a screen from a water suspension of the fibres. In the conventional method, fibres are prepared for fabrication by mechanical beating in water. Beating causes the fibres to absorb water and form a gel-like film on their surfaces by a structural change (hydration); this bonds the fibres and gives the paper its strength. The beating process necessary to provide this bonding also causes some of the troublesome behaviour of paper in printing, such as high expansion, excessive curling, slow oil absorption, etc. The new process substitutes synthetic resin bonds between the fibres for the gel-like bonds formed by hydration. The resin bonding gives a maximum strength with less beating and produces a superior paper by eliminating the adverse effects of hydration.

Further investigations in the use of experimental pulps are being made by the Forest Products Laboratory of the U.S. Forest Service. Included in these are aspen, paper birch and black gum; pulps have been produced by various chemical processes and mechanical grinding. Sulphite-cooked birch and sulphate-cooked aspen pulps have produced excellent printing papers with the aid of resin-bonding, whereas these particular woods have been previously neglected for paper making.

Several types of synthetic resins have been tried out, but so far melamine-formaldehyde has given the best results.

(From National Bureau of Standards' Notes in the Journal of the Franklin Institute of the State of Pennsylvania, September 1948).

Nuclear Physicists Meet.—About 35 physicists, including atom experts from Britain, America, France, Holland and India, attended a six-day conference of the International Institute of Physics held recently in Brussels.

Newsprint Prospects

Permits for 80,000 Tons

NEWSPRINT imports from the American Continent may reach 100,000 tons, which would not show any of the hoped-for increase, but merely equals the totals imported in 1947 and 1948.

This was revealed in the statement made by Mr. F. P. Bishop, general manager of the Newsprint Supply Company. The Board of Trade has announced that permitted imports from Canada and Newfoundland in 1949 will be a minimum of 80,000 long tons, of which 60,000 may be imported in the first half of the year. This leaves a balance of 20,000 tons minimum for the second half, but the Newsprint Supply Company has asked the Canadian and Newfoundland mills to reserve a further 20,000 tons for import should the dollar situation permit.

The need for more newsprint was recognised at the National Chamber of Trade annual conference at Bridlington, when unanimous support was given by delegates to a resolution appealing to the Government for increased supplies. The resolution stated that to businesses needing trade publications the restricted supply of newsprint was a great handicap.

THE NEW MERCURY CELL

A TENTATIVE agreement is stated to have been reached between the Monsanto Chemical Company (U.S.) and Dr. Oronzlo de Nora covering use and sale of the latter's mercury cell for the manufacture of chlorine, caustic soda, and hydrogen. Said to be the culmination of European improvements in mercury cells, Dr. de Nora's cell, in addition to production of pure caustics in strengths up to 70 per cent without concentration, is reported to produce chlorine and hydrogen of high purity at costs competitive with the best diaphragm cells now in use. Dr. de Nora is head of an Italian company engaged in the manufacture and sale of chemical plants.

The American chemical company was represented in the negotiations by Carlton M. Dean, a member of the company's engineering sales department, which will handle the sale of the new cell and of complete chlorine plant. He recently returned from a prolonged visit to Europe.

Nitrate Exports Increased.—Chilean nitrate production for the year ended June 30, 1948, totalled 1,753,579 metric tons, compared with 1,602,063 tons in 1946-47 and 1,603,820 tons in 1945-46. Exports in 1947-48 increased to 1,859,857 tons from 1,571,815 tons in the preceding year. Nine factories were in operation.

"High-Pressure" Pig-Iron

Production Claims for U.S. Process

CLOSELY following the recent announcement of the development of a one-step method for casting steel from liquid, a process which it perfected in co-operation with the Babcock & Wilcox Company, the Republic Steel Corporation, of Cleveland, Ohio, has just announced adoption of a new "pressure blowing" technique which, company officials claim, will raise its production of pig iron by at least 20 per cent.

The company has been testing the new technique since last June in converted blast furnaces at both Cleveland and Youngstown, Ohio, and is stated to have found that the process would permit increases in output, under certain conditions, up to 50 per cent. Production at one of the company's furnaces at Warren, Ohio, has been stepped up with the new process by 225 to 250 tons a day.

While not divulging the cost of conversion, understood to be very much less than the cost of erecting a new furnace, the company estimates that use of the pressure-blowing method will yield the equivalent output of about one new blast furnace that ordinarily would cost between $10-12 million.

Apart from increased production, advantages cited by the company for the new technique include efficiency in burning coke, more uniform quality iron, less flue dust, and an alleviation of the critical shortage of metal for the steel industry.

Under Pressure

In the new process the furnace is partly sealed by a system of valves to retain the hot gases. These valves cause the incandescent atmosphere within the furnace to build up a very high pressure which permits the production of higher temperatures in much shorter time.

As part of its multi-million dollar expansion and improvement programme, Republic Steel is preparing four other blast furnaces for use of the pressure blowing method.

Radioisotopes for Chile

Last week Chile became the 22nd country to receive radioisotopes under the United States programme for sharing the peaceful benefits of atomic energy with the rest of the world. France last week received a shipment of carbon-14, directed to the Laboratoire de L'Institut du Radium, Paris, for use in cancer research. This consignment will be used by Dr. A. Lacassagne to synthesise special types of organic compounds, benzacridines, for use in fundamental investigations of the cause of cancer.

Penicillin's Action

A Parallel with Soap

EVIDENCE that penicillin attacks germs in much the same way that soap attacks dirt has been reported to the American Chemical Society.

Recent research had shown that when a penicillin solution was added to a bacterial culture under the proper conditions the drug coated the individual bacterial cells, according to a paper by Prof. Ernest A. Hauser, R. G. and J. W. Phillips, and Dr. Ivan Vavruch, of the Massachusetts Institute of Technology, Cambridge, Massachusetts. Soap removes dirt by coating each particle and floating it away. Investigation of how penicillin performs its work "has opened up an entirely new way of evaluating the cause for antibiotic properties of matter which deserves far more attention than it has received so far," the chemists said.

Colloidal Solutions

Until recently, it was pointed out, the most commonly used penicillin preparations, such as sodium penicillin, had been classified as simple salts. The similarity of the molecular structure of penicillin to that of soap was so striking, however, that it was decided to study penicillin's antibiotic property in the light of colloid chemistry.

When ultramicroscopic investigations revealed that the penicillin solutions were not true solutions, such as ordinary salts yield, but colloidal solutions, it was further decided to study their surface tension. The results provided additional proof that penicillin salts, when put into solution, form a colloidal solution which will wet a surface just as soaps do. The penicillin salts also carry an electrical charge, as soaps do, and therefore have the tendency to cling to surfaces with an opposite charge.

That penicillin coats bacterial cells, just as soap coats oil droplets in an oil-in-water emulsion, has been visually demonstrated by means of ultra-violet light microscopy.

U.K. Goods for Denmark

The Danish Government announces that it has agreed to grant import licences for goods displayed at the British Exhibition in Copenhagen up to a value of £270,000. This means that many exhibitors will be enabled to save the cost of sending the goods back to Britain. Half a million people passed through the turnstiles during the first week of the exhibition. It is not, however, possible to record separately the visits of trade buyers, but some 16,000 season tickets were bought by business firms in Denmark, Sweden, Norway and Finland before the exhibition opened.

Technical Services

Demands on Powell Duffryn Unit

MR. EDMUND LAWRENCE HANN, chairman of Powell Duffryn, Ltd., in the course of his statement to be presented at the annual general meeting on October 27, which has already been circulated to the shareholders, says that progress in the development of the asbestos deposits in which the company is interested is, because of geographical and transport difficulties, necessarily slow, but exploratory work in the mining, transport and disposal is proceeding and future developments will depend entirely upon the result of these investigations.

Staff of Specialists

Referring to the company's subsidiary, Powell Duffryn Technical Services, Ltd., the chairman reported that it had been found that there was a real need for an organisation of this nature. The company had retained and recruited a staff of mining engineers, chemists, geologists, and others, of the highest technical qualifications, and its action in this respect had been more than justified.

Surveys and reports ranging through the whole field of coal technique, geology, mining, chemical treatment, processing, and its final utilisation, had been, or were being, made for the British Government on the coal resources of Nigeria, British North Borneo and Labuan, Sarawak and Brunei. Then the Government of Queensland, Australia, had commissioned the company under wide terms of reference to investigate its valuable and varied coal resources.

African Oil Plan

Powell Duffryn Technical Services, Ltd., had also entered upon new responsibilities in India and Nyasaland and in other parts of the world, the chairman observes. The Southern Rhodesian Government had recently entrusted the company with the preparation of a preliminary report on the production of oil from coal.

In regard to another subsidiary, Powell Duffryn Carbon Products, Ltd., Mr. Hann said important progress had been made in the applications of its new processes for the manufacture of carbon for electrical purposes. The company's research organisation, Powell Duffryn Research Laboratories, Ltd., had worked in close collaboration with the Carbon Company and in addition had devoted a great deal of its energies to the development of processes for the manufacture of carbon for chemical and metallurgical purposes.

Chemical Firm's Centenary

Offspring of the Gas Industry

SANDILANDS Chemical Works, Aberdeen, which was formed to exploit raw materials derived from Aberdeen gasworks, last week celebrated its 100th birthday. When the second Aberdeen gasworks was established in 1844, the prospect of development of by-product processing was appreciated by two Glasgow men, George Miller and John Poynter, who were called upon to assist in disposing of the Aberdeen residual materials. Their work resulted in the formation of John Miller & Co., now a branch of Scottish Agricultural Industries, Ltd., making tar and ammonia liquor products. Latterly the business expanded and production of granular fertilisers was added. As far back as 1878 the company had begun the processing of fish paste and claims to be the first company to tackle this work. It also pioneered, about 1880, processing of blood for fertilisers, later turning out albumen and feeding stuffs products. Early in its history it also made paraffin and candles from shale, but importation of American oil killed this side of the business.

£3,195,000 for Petrochemicals

It is announced that the capital of Petrochemicals, Ltd., has been increased from £5000 by £3,195,000, comprising 100,000 5 per cent preference and 3,095,000 ordinary shares of £1 each. It was reported (THE CHEMICAL AGE, May 22) that the Finance Corporation for Industry was to put up a further £1,450,000 for increased production of chemicals from oil. Robert Benson Lonsdale & Co., Ltd., and Erinoid, Ltd., are also big contributors and Petrochemicals was concluding agreements with the Lewis Berger group and British Paints.

Adaptable Stirrer

A new portable air-powered agitator has been designed by B.E.N. Patents, Ltd., for stirring or agitating liquids. It is equipped with two opposite pitch propellors adjustable on a rigid shaft, driven by a variable speed worm reduction air motor. The apparatus, which is readily portable, is arranged to be clamped to the side of drums or vats but an alternate mounting to permit up and down adjustment can be supplied. The motor can be used for other light mechanical duties such as turntable, or light conveyor drives, etc.

INDUSTRIAL USES OF SILICON TETRACHLORIDE

Wide Scope for Further Research

by H. G. EMBLEM and G. E. STOCKWELL

SILICON tetrachloride was one of the first silicon compounds to be prepared, being obtained by Berzelius[1] in 1824, by the direct chlorination of silicon. The reaction used by him is still the principal manufacturing method. Frequently in commercial practice ferrosilicon is used as a substitute for silicon.

An alternative preparative method is the reaction of a mixture of sand and coke with chlorine[2]:—

$$SiO_2 + 2C + 2Cl_2 \rightarrow SiCl_4 + 2CO.$$

Many suggestions have been put forward to render this process economically workable. The chlorination of silicon carbide has also been suggested as a manufacturing method for silicon tetrachloride[3].

Technical silicon tetrachloride contains, as its principal impurities, dissolved chlorine gas, together with the higher silicon chlorides. The chlorine may be removed by refluxing and the higher silicon chlorides by fractional distillation.

Silicon tetrachloride is a colourless, mobile, volatile liquid, miscible with most inert solvents. It boils at 57.5° C., at normal atmospheric pressure, and is heavier than water. The vapour is unassociated, as it has a normal vapour density.

Chemically, silicon tetrachloride possesses the typical properties of a non-metallic chloride. It is readily hydrolysed by water, yielding hydrochloric acid and silicic acid.

$$SiCl_4 + 4H_2O \rightarrow Si(OH)_4 + 4HCl.$$

This is in marked contrast to carbon tetrachloride, which is only hydrolysed by caustic soda solutions.[4] In several of its reactions silicon tetrachloride may be compared with an alkyl monochloride. It undergoes a similar Wurtz-Fittig reaction, and reacts similarly with a Grignard reagent. By methods utilising these reactions it is possible to introduce organic groupings, resulting in the organo silicon compounds. It is upon such reactions that the principal uses of silicon tetrachloride are based.

The reaction of silicon tetrachloride with a Grignard reagent results in stepwise replacement of the chlorine atoms by organic groupings.

$$RMgCl + SiCl_4 \rightarrow RSiCl_3 + MgCl_2 \quad (1)$$
$$RMgCl + RSiCl_3 \rightarrow R_2SiCl_2 + MgCl_2 \quad (2)$$
$$RMgCl + R_2SiCl_2 \rightarrow R_3SiCl + MgCl_2 \quad (3)$$
$$RMgCl + R_3SiCl \rightarrow SiR_4 + MgCl_2 \quad (4)$$

This reaction was first investigated by Kipping[5] in 1904, and opened up an entirely new field of research, which led to the industrial development of the silicone polymers. These polymers are prepared by the hydrolysis and condensation of mixtures of organo silicon halides.[6]

Silicon tetrachloride will react with hydroxylated organic compounds to give derivatives of silicic acid—the "silicon esters."

$$SiCl_4 + 4ROH \rightarrow Si(OR)_4 + 4HCl.$$

This reaction has assumed considerable importance with the growing technical utilisation of the silicon esters. In Great Britain silicon tetrachloride is reacted with industrial methylated spirit (64 O.P.) to give an ethyl silicate containing approximately 40 per cent of silica. The manufacture of silicon esters accounts for most of the British production of silicon tetrachloride.

In addition to its importance as an intermediate in the preparation of organo silicon compounds, silicon tetrachloride is now finding increasing use as an industrial chemical in its own right. Dilute solutions in an inert, low boiling organic solvent have been suggested as anti-shrink agents for wool,[7] and as treatments for reducing the surface reflectivity of glass.[8]

Textile water repellants may be prepared from silicon tetrachloride by reacting a tertiary amine with the reaction product of silicon tetrachloride; formaldehyde; and a fatty amide. The latter must contain at least twelve carbon atoms.[9] When mixed with trimethyl chlorosilane, silicone tetrachloride can be used as a water repellant substance for treating ceramic articles, and paper.[10]

Silicon tetrachloride may also function as a plastic modifying agent. Coating compositions, having improved durability and weather resistance, may be prepared from low molecular weight phenolic resins treated with silicon tetrachloride.[11] Thermoplastics are given increased surface hardness by treatment with silicon tetrachloride and water vapour under reduced pressure.[12] The polymerisation of olefins when carried out in the presence of silicon tetrachloride gives waxlike polymers.[13]

During wartime, in Germany, silicon tetrachloride found a considerable use in the preparation of a finely divided form of silica (K3), of particle size 10-100 milli microns.[14] Ultra fine silica is of considerable interest

(*Continued overleaf*)

Widening Technology of Spot Welding

New Basis for Determining Absolute Values

FOR the first time in this country it has been possible to put forward recommendations giving the absolute value of each of the main welding variables required for producing optimum results in spot-welding mild steel sheet. The recommendations—which form one of the three principal reports contained in the October number of the Welding Research Supplement of the *Transactions* of the Institute of Welding—are based almost entirely upon actual experimental results obtained by investigators of the British Welding Research Association during the past three years. Much of the experimental data from this work have been published in report form, so that the facts leading up to the recommendations are readily available.

In the past, it has been customary to set spot-welding machines for a given job on a purely arbitrary basis and pay little attention to absolute value of the machine variables. This practice makes it difficult to transfer established settings from one machine to another. Now there are no valid reasons why adequate instrumentation cannot be adopted in production.

The recommendations cover thickness of low carbon mild steel sheet ranging from 20 S.W.G. to 14 S.W.G. inclusive. Additional tests are to be undertaken shortly so that the recommendations will ultimately cover a wider range of thickness, *viz.*, 24 S.W.G. to ¼ in. inclusive.

In addition to the information on optimum machine settings, the recommendations put forward actual dimensions of the spot welds obtained and values are given of the order of strength to be expected from spot-welded joints. The question of permissible edge distances is discussed, data are given upon the settings required for spot welding multiple and different thicknesses, and reference is made to the effect of using one electrode of a normal truncated cone shape, with the other electrode of the pad type to preserve surface finish and avoid indentation.

The main recommendations for the optimum values of welding variables, weld strength, weld size, edge distance and pitch are summarised in a single table. Further tables show the effect of changes in each of the variables on weld strength, the increase in secondary current required to maintain weld size at various weld pitches and the effect of edge distance on the failing load of single spot welds.

SILICON TETRACHLORIDE

(*Continued from previous page*)

in the preparation of phosphors.[15] In World War I much silicon tetrachloride was used for producing smoke screens.[16]

At present the physics and chemistry of silicon tetrachloride are by no means fully investigated. The applications described above are not comprehensive, but are intended to illustrate the general principles of its industrial usage. Considerable research and development work must still be undertaken before final assessment of the potentialities of silicon tetrachloride is possible.

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METAL COATING REVIEWS

RUST preventives have been reviewed by Mr. Joseph G. Surchek before the U.S. Iron & Steel Convention. Contributions in the advancement of lowered maintenance in the steel industry are the petroleum base, non-drying protective coatings which are being applied to steel structures to prevent rusting. Difficulties in applying the high melting-point wax-type coatings have been overcome, he said, and it is now possible to apply those materials quickly and effectively by utilising heat and fluid pressure. He maintains that this method is used with equal success on flat surfaces and pipe interiors, according to the application of the coats and to the various atomising equipment which can be used.

The application of zirconium porcelain enamel cover coats at relatively low temperatures directly to the base metal in the manufacture of refrigerator parts will be described to the U.S. Porcelain Enamel Institute annual forum on October 13, at the University of Illinois, by M. E. McHardy, Hussmann Refrigerator Company.

STUDY OF ASH FUSIBILITY

Recent French Research on Combustion of Coal

DURING combustion, *e.g.*, of coal, the ash may be surrounded by either oxidising or reducing gases, and in termining fusibility it is important to stimulate actual conditions as nearly as possible. E. Rousseau, of the Creusot works of Schneider & Co., deals with some of the factors involved and describes suitable apparatus for the tests in *Chim. et. Ind.*, *60*, August, 1948, pp. 124-136.

In a previous paper (*loc. cit. 54*, 1945, 302-314) he had described the physical constitution of fuel ash and the chief methods used in determining fusibility. Reference is also made to a paper by Bro read at the 3rd Congress on Industrial Heating (*Chaleur et Ind.*, 1934, *1*, 37—March).

Prefacing the present article is a discussion of the principal phenomena occurring during coal combustion in ordinary grate furnaces and with powdered coal, and a method is given for determining loss of weight on calcination.

Such loss is practically negligible up to 1000°C. At 1300° it is 4.5-17.4 per cent in the case of fuels of high sulphur content, and it would seem that it is the sulphates that decompose last, either spontaneously or through reaction with certain ash constituents. Among the compounds formed may be calcium ferrates and double silicates of iron and calcium. The best temperature for ash analysis is 900-925°C. and, for fusibility tests, up to 950°C.

Coke Ineffective

In ground ash or slag there is usually a certain amount of unburnt coke which may prove an important factor in calcination temperature and ash fusibility. In the present work, the amount of unburnt was determined in ash calcined at 750°C. and the results were graphed and tabulated. It was shown that the presence of unburnt resulting from imperfect calcination did not greatly affect the fusibility tests, either in a reducing or oxidising atmosphere. Ash to which 5-15 per cent of pulverised coke was added gave in an oxidising atmosphere the same results as samples without such addition.

Production of carbon dioxide occurred only at the surface or periphery of the sample and not in the interior, where there was, occcordingly, no reducing atmosphere capable of converting the ferric salts into ferrous. The effect of a preliminary calcination at 950°C. for ½ hour was long tried. This did not affect the fusibility either in a reducing or oxidising atmosphere.

The apparatus used, either vertical or horizontal, was much the same as that in previous work. It is here described and illustrated in some detail, as is the curve recording instrument.

The general conclusions, in addition to those already indicated, are that: the addition of pulverised coke does not produce a reducing atmosphere; it is difficult to know precisely what is the atmosphere enveloping the ash in a grate furnace, and further systematic studies are still necessary; a simple an inexpensive method has been described, useful in all fuel laboratories, for determining the ash fusibility curve in a reducing atmosphere produced by placing a few pieces of coke around the test sample.

At Lower Temperatures

The results show further that the initial temperature in the reaction zone, corresponding with that at which slag first begins to form, is lowered by 40-140°C., and the sinking or subsidence temperature of 50 per cent of the test sample is also lowered by 10-155°C.

So far it has not been possible to trace any definite connection between the refractory quality of the ash and its chemical composition. The ash as a whole may be regarded as a rather complex refractory containing a vitreous phase consisting mainly of ferrous or ferric salts, of which the eutectics melt at relatively low temperatures. If the other constituents have a high refractoriness, such as the aluminium silicates, they keep the material in a viscous state up to very high temperatures.

On the other hand, if the ash contains sufficient of other constituents, themselves capable of producing exothermic reactions, the new products rapidly attain a relative fluidity which is more marked in a reducing atmosphere.

As indicated in a previous memoir, the author has pointed out that the refractory quality of an ash must chiefly depend, other things being equal, on the mineralogical nature of its component parts. If proper analysis could be made of an ash immediately after calcination, exact knowledge of its mineralogical constituents would throw a clearer light on the reactions taking place at the moment of clinker formation.

2200 Years' Service. — A remarkable record was celebrated recently when 61 employees of Lampson Paragon Supply Co., Ltd., whose service totalled 2200 years, were presented with certificates and awards.

Japanese Science and Technology

Chemical and Textile Progress Reviewed

THE development of a number of technological processes of contemporary importance is reported in Summation No. 32 of Non-Military Activities in Japan, issued by SCAP, a copy of which has recently become available in this country. Among these developments, were experiments to determine new uses for a synthetic fibre which is made from polyvinyl alcohol at the daily rate of 200 kg. by the Kurashiki Rayon Co., Ltd.

Polyvinyl acetate is saponified by alcoholic caustic soda and the resulting solution is spun in a bath containing zinc sulphate and Glauber's salt. The fibre is rendered insoluble by acetylisation in the presence of formalin, Glauber's salt and sulphuric acid.

High Chemical Resistance

This new fibre is claimed to have many advantages over other synthetic fibres it is, for instance, resistant to acid, alkali and oil; it is very strong and more resistant to abrasion than ordinary fibres; because of this superior strength, it can be used, in particular, for fish lines and nets.

A process for the production of coke of a quality suitable for large blast furnaces has been developed by the Fuel Research Laboratory of the Japanese Ministry of Commerce and Industry. Indigenous coal which does not yield coke of a sufficiently high calorific value with normal coking processes is used as a raw material. In the new process, which has already reached the pilot plant stage, pulverised coal is mixed with an equal amount of creosote oil and heated to 350°C. for ten hours.

The result is a pitch-like substance, called "Bojuntan" (swelled coal), from which a coke with a high calorific value can be made by the usual high-temperature processes of coke manufacture. Both non-coking and coking coals have been used successfully. The product can be used for blending with light coking coals to supplement the supply of imported coking coal.

In an effort to relieve the critical shortage of caustic soda in Japan, research work on its production by direct electrolysis of sea water is being conducted by the Teikoku Rayon Co., Ltd. Eight small electrolysers installed by the company at its Iwakuni mill in Yamaguchi prefecture are producing approximately 15 kilogrammes of caustic soda a day.

The purity of the product is reported to be 99.8 per cent, and it is recovered at 15-20 per cent concentration. Chlorine and bromine are obtained as by-products. However, the process requires 12,000 kW for the production of each ton as compared with 3000 necessary when using the ordinary electrolytic methods, but it is stated that this disadvantage is largely offset by the saving in power, fuel and labour required to produce and purify the salt used in the production of caustic soda.

At the second general sub-committee of the Chemical Industrial Technique Committee for the promotion of Japan's chemical industry, reports were submitted for discussion on soda, dyestuffs, oils and fats, paint, rubber, cement, calcium carbide and cyanamide. The committee's activities included the investigation of methods to improve production technique, the development of not yet used domestic raw materials, the best use of available materials, and the development of new products to overcome shortages and deteriorating standards for dyestuffs and rubber articles.

The report on dyestuffs reveals that research was conducted on the manufacture of dyestuffs intermediates. Standards for the quality control of dyes were determined and submitted for review to the Japanese Industrial Standards Committee. Application was made for obtaining procedures for the manufacture of dyestuffs new to Japan.

Promising Innovations

Of the recent inventions in Japan, the following are believed to offer the best prospects for industrial development:—

The use of waste middle oil (b.p. 250-300°C.) after repeated use in the separation of benzene and heavy oil from coal gas until it possesses no longer any absorbing power, as the basic vehicle for printing ink. The simultaneous manufacture of white phosphorus and phosphate of potash fertiliser accompanied by mixing limestone and potassic felspar or other potassium containing minerals with phosphate rock, adding a small amount of carbon as a reducing agent. The characteristic feature of this method lies in the use of potassic felspar in the place of silica in the manufacture of white phosphorus and in obtaining phosphate-potash fertiliser at the same time. The high yield of phosphorus produced is said to be of great purity.

Abstracting is reported to have been completed for the war-time and post-war periods of scientific articles which appeared in the *Journal of the Chemical Society of Japan*. These abstracts have been sent to the United States for publication in *Chemical Abstracts*.

Recent Work on Osmotic Pressures

Professor Procter's Findings Applied in Current Experiments

AMONG the papers read at the recent annual conference, held at Leeds, of the Society of Leather Trades Chemists, was one by G. E. Adair, M.A., F.R.S. (Reader in Biophysics, University of Cambridge), entitled "Recent Work on Osmotic Pressures, Membrane Equilibrium and the Generalised Free Energy of Protein Solutions in the Light of the Work of Procter," of which the following is a summary.

Procter's theory of the swelling of gelatin in hydrochloric acid was described by Loeb as one of the most original and ingenious contributions to modern science. The theory gives a remarkably clear and simple account of the large changes in the osmotic pressures of proteins caused by acids and alkalis.

Recent experimental observations on haemoglobin in phosphate buffers show an increase in osmotic pressure in the more acid and the more alkaline solutions, in general agreement with the theory, but the point for minimum osmotic pressure is on the acid side of the *p*H for minimum combination with acid or base. The difference may be as much as 0.2 *p*H units for 0.01 molar phosphates and 0.7 units for 0.05 molar phosphates.

Measurements of the membrane equilibrium of ion, if allowance is made for hydration of the protein, indicate that haemoglobin causes relatively small changes in the activities of cations like sodium, potassium or ammonium and relatively large diminutions in the activity coefficients of phosphate and chloride ions.

A reaction of the following type might cause similar changes in ion distribution and osmotic pressure.

$$-Pr^+ + Na^+ + Cl^- = [PrCl]^- + Na^+$$

$-Pr^+$ denotes a protein double ion, $[PrCl]^-$ a protein ion with a combined or associated chloride ion neutralising one positive charge.

Effect of Salts

Although salts tend to diminish osmotic pressure in the range of concentrations studied by Procter and Wilson, they usually increase the pressure in the range where most of the observed pressure is due to the protein itself. This observation might be explained if groups on the surface of the protein molecule can attract either an inorganic ion or a second protein molecule.

If many inorganic ions are present, the chance of attracting a second protein molecule is diminished, and the osmotic pressure should be increased. The effect may be compared with a diminution in the term a in van der Waal's equation for gas pressure.

The net excess of salt associated with a protein can be correlated with its solubility and activity.

In studies of the effects of electrolytes on swelling and osmotic pressure of proteins, reproducible results are most readily obtained by the use of relatively large volumes and several changes of the external liquid or dialysate, preferably a buffer mixture with a well defined *p*H value.

Use of Buffer Mixtures

The chemical potential of salts, acids and water must be the same on both sides of the membrane, in a state of equilibrium. Buffer mixtures can be used to control the potentials in a series of protein solutions in a manner comparable with the control of temperature by a thermostat.

Thermodynamical formulæ applicable to dialysed protein solutions may be derived from a function A_G. A revised form of the first definition of this function is stated as follows.

The function A_G termed the generalised free energy of any system is equal to the total energy of the system, minus the sum of all individual forms of energy that include an intensive factor controlled by an external system.

The factors here termed intensive are the temperature T, the pressure with negative sign, symbolises $-P$, $(-P = \delta U/\delta V)$ and the chemical potentials. The total energy of a fluid U is regarded as the sum of at least three individual forms of energy, the thermal energy TS, the mechanical energy PV, and the chemical energy $\mu_i n_i$ for substance i. S = entropy of the fluid. V = volume. n_i the number of mols of i. μ_i chemical potential of i.

In fluids with a constant mass of each substance, there are two intensive factors to consider, T and P, four combinations of intensive factors, and four possible values for A_G, equivalent to the well-known functions termed energy, heat content, free energy of Helmholtz and free energy of Gibbs.

If any of the potentials be controlled, an unlimited number of functions of the same type can be obtained by deducting products like $\mu_i n_i$ from the energy. All the functions are special cases of one function A_G, so that methods used in deriving thermodynamic relationships from the well-known functions may be applied to more complex systems, such as dialysed protein solutions, where potentials are controlled.

World News of Chemical Industry

FRENCH CHEMICALS REVIEWED

Recommendations to Implement the Monnet Plan

A STRONG commission has been appointed, under the presidency of M. Étienne, to implement the Monnet Plan for the French chemical industries, with the assistance of about a dozen sub-commissions. The commission's programme and objectives have recently been reviewed by M. Daniel Florentin (*Chim. et Ind.*, 1948, *60*, 283-290, September) and following are some of the main features.

Native Alkalis

The alkali section is probably among the most progressive, and is to some extent fortunate in having plentiful supplies of native salines and potash. Production of sodium carbonate reached 472,000 tons in 1946, 600,000 tons in 1947, and has achieved a monthly output of about 60,000 tons so far this year. Exports should soon reach 200,000 tons annually. Caustic soda, too, has shared in the advance, including the electrolytic product in conjunction with chlorine. The glass industry, largely dependent on alkali and fuel, has benefited so far as the former is concerned, although the fuel position, including electric power, is not what it should be. The Alsatian potash mines have resumed full activity, with a monthly output of 70,000 tons K_2O, as compared with 52,000 tons in 1938. This will all be required for home agricultural needs as the fertiliser review shows.

Sulphuric acid production of 100,000 tons per month, has now attained pre-war level. In 1946 it was 846,000 tons, and in 1944, 149,000 tons. Repairs to plant, however, are badly needed. The various processes are exemplified: contact at Paimboeuf, starting with sulphur; and at Port-de-Bouc using pyrites (blendes) and flash roasting; at Miramas (Service des Poudres) gypsum is used with the Séailles process, with simultaneous production of alumina instead of cement.

Elsewhere, SO_2 is directly converted to ammonium sulphate by the German Katasulf method; and of special interest is the joint manufacture of nitric and sulphuric acids under the Matignon-Kachkaroff patents. Total output for 1948 is estimated at 1.4 million tons, and by 1950, 2 million, of which half should be used for superphosphate.

Electrolytic chlorine, for which the demand is rapidly growing, is to be considerably enlarged, up to 130,000 tons in 1950 together with 100,000 tons NaOH. Here again much is needed in respect to plant repair and extension, as well as additional supplies of electric power. Chlorine is now increasingly required for chlorinated derivatives, *e.g.*, in the manufacture of phenol from chlorobenzene instead of the sulphonate. More power is also required for chlorates, of which plant capacity is 40,000 tons and 1947 output was 20,000 tons.

In the important fertiliser section the 1950 estimates (1938 in brackets) in 1000 tons; are : nitrogen 500 (200); P_2O_5 800 (400); K_2O 800 (300). The sub-commission hopes to increase nitrogen production capacity ultimately to 750,000 tons. Monthly output for 1948 so far is about 17,000 tons. To assist in solving the hydrogen problem it is suggested that natural gas, such as that of Saint-Marcet, may be used, *e.g.*. in the methane plus water method. Output of pre-war superphosphate was 1.2 million tons; for 1947-48 it is hoped to reach 3 million tons (500,000 P_2O_5); and in 1950-1, 4.8 million. Ambitious plans, too, have been made for mixed fertilisers, and considerable progress made.

Calcium carbide production has reached pre-war level of 13,000 tons per month, while plant capacity should be increased to 20,000, the chief limiting factor being adequate power for the electric furnaces. Calcium cyanide should be better employed for organic synthesis, *e.g.*, nitroguanidine, than as fertiliser; and every effort must be made to increase supplies of acetylene for several fairly obvious reasons, and it may be more economically produced from natural gas (Saint-Marcet methane) than from carbide.

Sulphate Supplies

In regard to sulphur, etc., France is well supplied with sulphates, especially gypsum, which could be used for production of elemental sulphur or ammonium sulphate. Native sulphur mines yield about 150,000 tons towards a total home demand of 800,000 tons. These should be further developed; and more efficient recovery secured from coke ovens, etc.

In the organic industries, hydrocarbons, and especially petroleum come first, as a source of numerous valuable chemicals. The Saint-Marcet natural gas is being more thoroughly exploited: 14.5 million cu.m. (9500 cal.) were, it is said, produced in

(*Continued at the foot of page 490*)

CANADA'S SYNTHETIC NITROGEN

War Plants Now Serving Agricultural Needs

CANADA was a pioneer in the production of nitrogen fertilisers from the air. Low cost hydropower at Niagara Falls was largely the cause of the establishment there of a plant for the manufacture of calcium cyanamide in 1909, and by 1930 at Trail, B.C., and Sandwich, Ont., installations for the manufacture of nitrogen and fertiliser were well developed.

At the outbreak of World War II, Canada was producing some 10,000 tons of by-product nitrogen from the manufacture of coke. This with 110,000 tons of synthetic nitrogen represented the Dominion's entire production of 120,000 tons, about 90 per cent being exported.

Great Britain asked Canada to create additional facilities for the manufacture of nitrogen in the spring of 1940, as her own sources of supply were within the bombing area, reserves of ammonium nitrate being required. Four new projects were started, two at Trail, B.C., one at Calgary, Alta., and the largest at Welland, Ont.

Thus began the now historic production of this chemical, and the ammonium nitrate has contributed much to the production of foodstuffs since the conclusion of hostilities. The existing plant at Trail was extended to provide for an additional output of 50 tons of ammonia per day, while ammonia was also manufactured in a new plant at Trail, using coke-ammonia to make 250 tons of ammonium nitrate a day.

Thus, in 1941, Canada's synthetic nitrogen capacity increased more than twice. With this capacity, the demand for explosive nitrates was satisfied. As the British plants still continued in commission, the increased supplies in 1942 posed the problem of utilisation of the existing ammonium nitrate produced. The problem, therefore, was to adapt the ammonium nitrate production of explosive plants for use in agriculture.

Ammonium Nitrate Difficulties

As originally made for explosives, ammonium nitrate was a material which absorbed water from the air, which made it quite solid and difficult to use. In this condition it was not wanted in a fertiliser plant. It was hard to dispose of. To solve the problem, a joint co-operative programme between the Canadian authorities and the United States Department of Agriculture was immediately initiated to determine methods of preparing ammonium nitrate so that it would be reasonably acceptable to agriculture as a fertiliser.

In this effort to solve the problem of improving the physical condition, most successful experiments were conducted by a chemist at a plant in Calgary. He allowed a concentrated solution of ammonium nitrate to drop through the air. Using a tomato can with a perforated bottom, he poured ammonium nitrate solution from the top of a four-storey building in the Calgary plant and, to his intense gratification, discovered that the particles that fell to the floor were white rounded beads that looked like tapioca. This process, known as "prilling," was rapidly adopted, first at Calgary, then by the other Canadian Government plants.

The product was packed in waterproof bags, and thus a very high grade fertiliser known at nitraprills, containing about 33 per cent nitrogen, was marketed and met with great favour.

Superior Fertilising Material

Continuous experimentation has resulted in producing a highly superior fertilising material. To-day, the entire Canadian production of ammonium nitrate fertiliser is in the improved prilled form, consisting of small granular pellets of pure ammonium nitrate dusted with an inert material, usually diatomaceous earth. This assists in preventing caking of the product, and the resulting material is free-flowing and exceptionally easy to handle for direct application to the soil, and as a component in complete fertilisers.

The guaranteed analysis is now 33½ per cent nitrogen. Extensive use has shown that Canadian ammonium nitrate is safe to handle and store if special precautions are followed.

This material is produced in Canada by the North American Cyanamid Company, Ltd., and the Consolidated Mining and Smelting Company of Canada, Ltd., under the respective trade names of Aeroprills and Nitraprills. Packing at all Canadian plants is in five or six-ply paper bags, including at least two plys of moisture-proof, laminated, asphalt paper, to prevent moisture absorption by the material, and this also reduces the possibility of caking.

Ammonium nitrate fertiliser for purposes of transportation is classified as an oxidising material. Special precautions, under published instructions of the Canadian Board of Transport Commissioners and the National Harbours Board, are taken in its movement by land and water. It offers much the same fire hazard as sodium nitrate and may be considered a vigorous supporter of combustion, due to its liberation of oxygen at moderately high temperatures.

Canadian consumption of nitrogen fertiliser

has increased from some 11,000 tons in 1940 to about 27,000 tons in 1947. It will be noted that on a population and crop acreage basis, Canada still uses relatively little nitrogen as compared with some other countries. About 90 per cent of it is used as an ingredient of mixed fertilisers and 5 per cent as materials for side dressings mainly the leafy vegetable crops.

The estimated tonnages of nitrogen materials for all fertiliser purposes used in the trade year ended July 1, 1948, were: ammonium nitrate, 28,455 tons; sulphate of ammonia, 36,174 tons; cyanamid, 9654 tons; ammonium phosphate 16-20, 4385 tons; ammonium phosphate 11-48, 40,250 tons; nitrate of soda, 620 tons; nitrogen solutions, 7210 tons; and anhydrous ammonia, 570 tons.

In the trade year 1946-47 there were used in Canada, according to the Dominion Bureau of Statistics, a total of 657,782 tons of all fertilisers, and of this 561,464 tons were mixtures. It is notable that of the total tonnage of mixed fertilisers used, 176,647 tons were of 2-12-6 grade and 164,986 tons were of 4-8-10 grade. The amount of 2-12-6 and 4-8-10 sold was 341,633 tons, or about 60 per cent of the total tonnage of mixed fertilisers. The 2-12-6 is the most popular fertiliser for grain and farm crops and the 4-8-10 the potato and garden crop fertiliser. Other countries may be using more nitrogen for these crops, but so far Canada has not found this necessary.

Canadian exports of nitrogen under International Emergency Food Council allocations during the trade year ended June 30, 1948, are estimated at 132,422 tons of nitrogen as compared with the total domestic consumption of 27,000 tons.

The significant change from pre-war exports is that North and South America now account for a much larger proportion of the world export pool. In pre-war years, Germany, for instance, was a net exporter of nitrogen, while at present Germany is a net importer.

That the world pool of exportable nitrogen for 1948-49 is not nearly large enough to meet world requirements needs to be underscored. If present world price levels are maintained sufficient to purchase the nitrogen needed, it is quite unlikely that there will be enough nitrogen fertiliser in 1948-49.

Without the very substantial war and post-war increase in production in Canada and the United States, the world supply position to-day would be much worse than it is; in fact, without this additional tonnage, world supply problems would be almost insurmountable.

(From an article by S. G. Barkley, Foreign Trade Service, Canada, in *Foreign Trade*, Ottawa).

FRENCH CHEMICALS REVIEWED

(*continued from page 488*)

March of this year. Work in this direction, both for liquid oil and gas, is being pursued in Aquitaine by the SNPA under M. Blanchard, and in Toulouse region by the Unitec. engineers. The Monnet Plan envisages crude petroleum supplies amounting to 11 million tons in 1950, and 15 million in 1955, of which refineries in France would deal with 8.1 and 11.5 million respectively.

These large figures seem remote from present possibilities. Among the difficulties is the short supply of steel for refinery construction or repair. Nevertheless, the importance of crude as a raw material for chemicals is not overlooked, and the sub-commission for petroleum chemistry has an extensive programme for 1950, including solvents, detergents and plastics.

In other fields, such as cellulose, synthetic rubber, resins and plastics, far-reaching plans have been made, including as a primary essential the better use of home raw materials, such as the Landes forests for cellulose, wood pulp, and other forest products; whereby, among other things, heavy imports of cotton and linters could be reduced. Production of plastics in France should reach 106,000 tons in 1950, or four times the present level.

S. AFRICA REVIEWS FLUID MEASURES

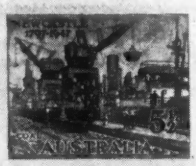
BRITAIN'S exporters of certain chemical products may have to change their gallon containers for the supply of customers in South Africa.

Numerous manufacturers in the Dominion, adversely affected by imported products, are considering the abandonment of South African and British measures and substituting those current in the U.S.

The S.A. Bureau of Standards, which has formed a special committee to examine this problem, is seeking also the views of commerce and industry regarding a project to require that all imported liquids shall be packed and marked only in South African measures. The views of industry are being sought, too, concerning an additional proposal that it shall be made illegal to continue the system of selling liquids in containers labelled "large," "medium" or "small," without quoting exact quantity.

It has been pointed out by the Bureau of Standards that one American gallon is equivalent to three quarts and thirteen Imperial fluid ounces and, as there are forty fluid ounces to a quart, this means that there are twenty-seven Imperial ounces less in an American gallon than in an Imperial gallon as used in South Africa and Britain.

Stamps of Six Nations Dramatise Coal



Mining Industries of Two Continents

The vital function of a vigorous coal mining industry in the affairs of a nation is widely recognised throughout Britain to-day. On the Continent and elsewhere the theme is far from new, as this "Chemical Age" excursion into philately demonstrates. Illustrated here (left to right, above) are: Australia, 5½d. (green), issued in 1947 to commemorate the finding of the first coal seam at Newcastle in 1797; Germany, 12 pf. (carmine), commemorating the acquisition of Sudetenland in 1938; Saar, 20 pf. (slate and green), showing a pit-head at Reding, 1921. Left and right, second row: Russia, 10 k. (blue) depicting coal-miners at pit-head, released in 1941 in honour of the industrial output drive; Poland, 20 z. (slate), issued 1947. Left and right, third row: Saar, 5 pf. (black and orange) miner, 1922 printing; Germany, 6 pf. (green), charity issue of 1934. Below, left to right: Austria, 40 g. (brown), the 1948 stamp showing colliery at Erzberg in Styria; Russia, 30 k. (violet), coal miner and colliery on 1941 series; France, 2 f. 15 c. (slate-purple), produced 1938-41, depicting miners leaving pit-head

European Chemicals and Minerals

Industrial Stringency in Sweden

Dollar Shortage Cuts Chemical and Metal Supplies

DRASTIC cuts of imports which have to be paid for in dollars threaten to have a serious adverse effect on Swedish industry, especially in essential commodities such as chemicals, iron and steel, metals, etc., which are already scarce.

Reduction in production, as the *Finanstidningen* points out, would seem to be an inevitable consequence, unless Sweden can make up her imports by purchases from non-dollar countries. The most serious effects of these import restrictions are pointed out by this journal.

In chemicals, dollar imports for the third quarter of the year are cut to 2.8 million kronor. Imports of paraffin have been curtailed and it will be allocated to the wall-board industry only for export production; production in the rubber industry will be cut, as only half the chemicals needed have been allocated; the sulphur imports will be insufficient to meet the needs of the cellulose industry—even presuming the Swedish sulphur kilns at present closed down, are re-opened.

Engineering production will be slowed up by the short supply of thin steel plate and bolt iron. Non-ferrous metal imports have been cut to one-third of the earlier plan, which is causing considerable concern over its effect on the aluminium, and canning industries.

A decrease in production of motor-car tyres and delay in telephone plans are necessitated by the cuts in textiles and electrical materials respectively.

POLAND'S ECONOMIC PLAN

ACCORDING to data given in the journal of the Central Polish Planning Office, *Gospodarski Planowa*, the value of the output of the State-owned industrial enterprises is to be increased next year, which is the last year of the Three-Year Plan, by 21-23 per cent. Plans have also been made for geological investigations to locate further deposits of coal, lignite, oil, potassium and of materials for the ceramic industry.

Coal output is to be increased next year by ten yer cent over the planned figure for 1948 (67.5 million metric tons), oil output, the 1948 target for which is 155,000 tons, is to be increased to 103 per cent. Iron-ore output is to rise by 25 per cent from the 1948 level of 700,000 tons, and steel output, planned at 1,783,000 tons, is to be raised by 20 per cent. In the chemical industry, sulphuric acid production is to be increased by no less than 28 per cent from the 1948 planned level of 116,000 tons, superphosphate output is to be higher by 34 per cent (400,000 tons), and an increase of 15 per cent is sought in the manufacture of nitrogen compounds.

ITALIAN SALT OUTPUT

PLANS for the development of salt production of the country within the ERP scheme are attracting the attention of the Italian government.

One of the principal salt-beds in Italy is Margherita di Savoia, approximately six miles from the little port of Barletta in the region of Bari. The yearly output of this bed is roughly 300,000 tons, but without undue effort it could reach 500,000 tons, and the Direction of Italian Monopolies, which controls the salt production, now aims to double the current production figure.

Salt from Margherita di Savoia had a good reputation, and exports grew steadily from 1935 until the beginning of World War II. There was a natural interruption during the period of hostilities, but in 1946 exports again revived and have been improving ever since. One of the problems is the question of loading. The sea is extremely shallow here, and salt has to be conveyed by barges to ships lying about two miles out; this method is expensive and slow.

Barletta can load a larger number of vessels at a cheaper rate, and during the war loading was transferred there, but when it finished, local rivalry caused a return to the old method.

GERMANY'S SWISS ASSETS

INFORMATION from Berne is that the Swiss Government Compensation Office has given notice of the forthcoming liquidation of Leukon A.G., Zurich. This firm was founded in 1921 by Degussa Deutsche Gold- und Silberscheideanstalt, Frankfurt, for the marketing and distribution of their products. The share capital of Leukon A.G. is 400,000 francs, and the company engages in the manufacture of and the trade in chemical products and metals.

United Kingdom firms wishing to investigate can obtain full details by writing direct to the Swiss Compensation Office, Talstrasse 62, Zurich, to whom bids should also be made.

India's Steel and Chemicals

Nationalisation Programme Criticised

REFERRING to the proposal of the Government of India to build one or two steel works to be run by one or more statutory corporations, Sir Ardeshir Dalal, presiding at the 41st general meeting of the Tata Iron and Steel Co., Ltd., in Bombay, said, while there was no question that more steel needed to be produced in India, it was unfortunate that the Government had chosen the steel industry for their venture on nationalisation.

It was one of the most complicated and difficult of industries, the nationalisation of which, even in a country like the United Kingdom, with its long industrial experience and high technical development, was looked upon with grave apprehension by a large number of people, said Sir Ardeshir.

The Government had rejected a scheme submitted by the company, under which the technical and managerial experience accumulated by the industry would have been made available to the Government in the management of the new works.

This year production of finished steel had declined from 753,000 tons to 664,000 tons, compared with the peak production of 839,000 tons in 1941-42.

The three consultant firms engaged by the Government of India, namely, The Koppers Co., Arthur G. McKee and Co., and the International Construction Co., are now busy drawing up independent reports on the first stage of the proposed Government-owned, million-ton steel plant. All the three firms are required to submit their reports by the end of the year.

* * *

Hopes have been raised that the plans for the manufacture of aluminium in the Central Provinces and Berar, will make possible a large exploitation of the china clay, very large deposits of which are found in the Provinces. According to Mr. S. Dogar Singh, who investigated the deposits, recent scientific experiments have found use for china clay on a commercial scale as a source of alumina for the manufacture of aluminium. Neither the Provincial Government nor the industrialists have so far exploited these deposits, the main reason being that the cost of the preliminary outlay is very heavy.

* * *

Representatives of the Indian Government and the Indian Supply Mission were at a recent meeting at Washington between officials of the United States Commercial Departments Office of International Trade and a committee from the Alkali Advisory Panel, at which a proposed licensing plan for screening applications for alkali products was announced. The Indian officials, Mr. R. R. Saksena, Indian Consul-General in New York, and Mr. M. B. Shankar, of the Indian Supply Mission in Washington, were invited to the meeting to gather first-hand information on problems faced by licensing officials with expert applications for alkali products far exceeding the total output of the United States.

The recently announced export quota for caustic soda grants India 14 million lb., which is approximately 10 per cent of the total export quota for the third quarter of 1948. The Indian quota for the first six months of this year was nearly 25 million lb.

* * *

The Prime Minister of India, Pandit Jawaharlal Nehru, who is also the President of the Board of Scientific and Industrial Research, has appointed a committee to draw up plans and estimates for the Central Electro-Chemical Research Institute to be established at Karaikudi in South India. Dr. Alagappa Chettiar is chairman of the committee.

* * *

Dr. Lichi Pan, member of the Industrial Development Working Party of the United Nations Economic Commission of Asia and the Far East, arrived in Madras recently in the course of his tour on which he is collecting data in regard to the fertiliser industry. He visited the Mettur Chemical and Industrial Corporation's factory and the fertiliser and chemicals factory at Alwaye. Dr. Pan, who is also a member of the National Resources Commission of the Republic of China, stressed the importance of the fertiliser industry in the production of food. Vermiculite, the mineral which gives rise to new possibilities in building construction, has just been discovered in Mysore State, by the Mysore Geological Department working under the direction of Dr. Charles Pichamuthu. Large deposits of this mineral have been found in Tumkur and Hassan districts of the State.

Production of Chemicals and Metals.—The index figure for production of chemicals in the U.K. in June, published by the Central Statistic Office, is 117, which compares with the monthly average for 1947 of 105. The figure for ferrous metal manufacture is 120 (102 in 1947), and for non-ferrous metals 118 (113 monthly average in 1947).

DUTCH CHEMICAL PROGRESS

Great Demand for Agricultural Chemicals

by J. GREENROYD

SINCE the war the Netherlands has shown a growing impulse toward greater industrialisation, an impulse which has become apparent to a marked degree in the chemical industry. This tendency has been partly due to ground lost in shipping, agriculture and stock-breeding, and partly because a number of products formerly made by the Germans are now manufactured in Holland. Of the latter, those which affect the Dutch chemical industry include such products as plastics, pharmaceutical goods, artificial teeth, mineral oil and its by-products, etc.

The Dutch chemical industry is based in the main upon its mineral wealth—coal, salt, petroleum, and upon vegetable and animal raw materials produced at home, together with a few imported raw materials, including pyrites for the manufacture of sulphuric acid, crude phosphates for making superphosphates, and iron and zinc ores.

Before the war about 30,000 workers were employed in the industry, which was composed of 2250 concerns (including pharmaceutical chemists) whose produce was valued at about £20 million. By 1947 the Dutch chemical industry employed 38,000 workers, and there has been a tendency for the average size of factories to increase.

Agricultural Chemicals

One of the outstanding branches of the industry in Holland has been the manufacture of artificial fertilisers. This received a great impetus from the large home demand of the intensively conducted agriculture and market gardening. The relative volume of fertilisers used in Holland in normal times was the largest in the world, being 60/70 kilogrammes per hectare compared with less than ten kilogrammes in Great Britain and about three kilogrammes in U.S.A.

Both nitrogenous and phosphatic fertilisers are now normally produced in sufficient quantities to satisfy the home demand and to allow a surplus for export.

The most important producers of nitrogenous fertilisers are the State mines, the Coke Oven Gas Company (M.E.K.O.G., Ltd.), and certain gasworks.

The Compagnie Néerlandaise de l'Azota, situated at Sluiskil, Zeeuws-Flanders, also produced large quantities of nitrogenous fertilisers. This factory was completely destroyed during the war, but production was expected to be resumed there this year. In consequence of planned expansion, the yearly production of the whole industry in about 1950 will be the equivalent of approximately 200,000 tons of nitrogen.

For the manufacture of phosphatic fertilisers, which is the most important group, crude phosphate has to be imported by way of the navigable waterways to the eight producing factories situated mostly in the regions of Rotterdam and Amsterdam, and at Sas Van Gent in Zeeuws-Flanders. Before the war, production was about 550,000 tons a year and this was surpassed soon after the end of hostilities, but just at this time there was an abnormal home demand of 600,000 tons due to the shortage of fertilisers during the war years. The superphosphate factories are also important producers of sulphuric acid.

Superphosphate Deal

As a result of talks earlier this year between the Russian military administration and a Dutch delegation in Berlin, it was agreed that Holland would supply 80,000 tons of superphosphates to the Russian zone, while Holland would receive in return 80,000 tons of potassium salt (40 per cent), delivery to be made in the manuring year 1948-49.

Among the products manufactured from coal are benzol, xylol, naphthalene, etheric dichlorate, nitrogenous products and ether. The turf in the province of Drenthe serves as raw material for active carbon, and from the salt which is found in Geldersche Achterhoek are manufactured hydrochloric acid, chlorine, soda and alkaline soda.

Mineral oil assumes an important rôle in the Dutch economy. Although in the past very little has been obtained in Holland itself, the output from the national soil has recently become more significant. Borings have been made in the province of Drenthe, which, according to estimates, are expected to yield approximately 240,000 tons in 1948. These fields belong to the Netherlands Petroleum Company and management is in the hands of the Bataafsche Petroleum Company, which holds 50 per cent of the capital, the remainder being held by the Standard Oil Co., of New Jersey.

Of greater importance still are the mining undertakings operated in other parts of the world—particularly Dutch East and West Indies. Space forbids details of the activities of the Royal Dutch Shell Group. Suffice to say that considerable extensions are in-

tended to the Bataafsche refinery at Pernis, Rotterdam. The processing capacity of this refinery is at present 1 million tons of crude oil per year. When the contemplated extensions have been completed in 1953 this capacity will be increased three-fold.

A second refinery at Pernis is also expected to be completed in 1950 for the Caltex Company (the Texas Company and Standard Oil of California) which is scheduled to cost about $20 million. The daily capacity of the new refinery will be 20,000 barrels of crude oil, chiefly from the Middle East.

The Vlissingse Mineraalolie En Aspaalt Raffinaderij (Vlismar) are also constructing new installations on the east bank of the second petroleum port at Rotterdam.

Petroleum Chemicals

The petroleum industry is developing the production of chemical by-products. The Royal Dutch Shell Group is now manufacturing such products as washing agents, solvents and artificial fertilisers, as well as raw materials for synthetic resins and synthetic rubber. At Pernis two factories are being constructed for Shell chemicals. The first factory is expected to be capable of producing 25 million kg. of washing soap per annum.

The second factory, which is also to start production this year, will manufacture synthetic resin and will have an annual capacity of two million kg. This will form a raw material basis for the plastic industry. Paraffin wax will constitute the foundation for the soap, while polyvinyl chloride is manufactured from gases produced by the cracking operations in the oil refinery. Both factories are expected to be completed this year.

The Royal Dutch Shell possess a very up-to-date laboratory at Amsterdam along the River Ij, where a staff of over 1500 persons are employed, as well as a testing station at Delft from which originated the cetane number that has been universally adopted for measuring ignition quality of diesel oil.

During and since the war research has been made into the possibilities of producing a synthetic substitute for the fats, which, essential to the supply of sebacic fatty acids for soap, were becoming very scarce. In Holland a compound similar to the German Tylose HBR has been produced which serves as a great improver of the various synthetic washing preparations. This is the raw sodium salt of carboxy-methyl-cellulose, prepared from caustic cellulose and monochlor acetic acid.

The manufacture of artificial silk yarns and tissues has progressed very rapidly in recent years, the firms of N.V. Kunstzijdespinnerij NYMA and AKU/HKI being well-known. In spite of severe war damage, pre-war output has been appreciably exceeded and production is steadily increasing.

In 1947 the exports of rayon yarn and rayon fibre amounted to 27,560,000 lb. Besides the main Netherlands mills at Arnhem, AKU controls plants in several other countries.

Coal-tar distilleries, of which there are six large concerns, are of considerable importance within the Dutch chemical industry, as is the palstic side of the industry, which is providing for future expansion.

In a small country like Holland, where the home market is fairly quickly satisfied, production is determined to quite a large extent by the exportable surplus possible. This applies very much to the chemical industry and the following table compiled by Economische Voorlightingsdienst shows how, up to the end of last year, exports were faring compared with 1946 and the pre-war years :—

	1947	1946	Average 1938 and 1939
Artificial silk yarns and tissues	65.0	24.6	16.2
Artificial manures ...	25.2	3.3	21.1
Dyes, lacquers and varnishes	19.5	7.3	2.3
Quinine...	15.5	0.5	9.0
Linoleum and felted floor cloth	12.4	4.3	1.6
Medical products (not including Quinine) ...	10.4	4.4	3.1
Coal tar products ...	8.5	2.7	15.0
Synthetic scents ...	7.2	2.2	1.7
Salt	6.0	3.2	1.5
Dry dyes	5.3	2.8	3.4
Glue	3.9	1.5	1.1
Saccharine	3.0	2.4	0.01
Essences	2.8	1.5	1.1
Etheric oils	2.1	1.2	1.7
Magnesia	1.8	0.5	0.6
Burnt pyrite	1.3	0.7	1.5
Printers ink	1.1	0.3	0.1
Artificial resins ...	1.0	0.5	0.4
Cosmetics	1.0 ...	0.7	0.3

Future industrial expansion in the Netherlands is expected in three main directions :—

1. Heavy chemicals.
2. Industries dependent to a great extent on laboratory research and individual invention.
3. Old-established industries, such as textiles.

The first involves such installations as oil refineries, fertiliser factories and iron and steel works, which will make good use of the natural sites and the large river estuaries, while the second class includes such items as pharmaceutical products and the third class could include rayons.

It would seem, therefore, that the chemical industry in the Netherlands is well-placed to assume a rôle of prime importance in the future industrial set-up of the country.

American Chemical Notebook

From Our New York Correspondent

PRODUCTION of industrial inorganic chemicals for July was slightly higher than in July a year ago. In the U.S. Bureau monthly survey reductions below the level in June were reported in 22 and increases in only 13 of the 35 chemicals under review. For the fifth successive year production of "dry-ice" (solid carbon dioxide) has increased, figures for July being 92,036,000 lb., an addition of 10 per cent on the previous record. Among the "heavy volume" inorganic chemicals, production of sulphuric acid and salt cake was almost the same as the previous month; soda ash, ammonium nitrate, nitric acid and phosphoric acid showed an increase, but synthetic ammonium sulphate, chlorine, hydrochloric acid and caustic soda were less than the previous month.

* * *

Mexico still remains dependent on imports for about 45 per cent of her steel requirements, according to the U.S. Department of Commerce, which has recently completed a survey of industry there. In spite of the expansion of the steel industry during the war, imports of major steel products from the United States had risen from a pre-war figure of 36,000 metric tons to 205,000 metric tons in 1946 and were still insufficient. This is mainly due to a large public-works programme including irrigation, electrification, road building and other improvements. Mexican steel plants continue to expand, but demand is greater than the rate of production, scarcities being most marked in tin plate, ternplate, all kinds of pipes, and structural and reinforcing steel.

* * *

The vital importance of chemists and other trained scientists as teachers was emphasised by Professor Linius Pauling, of the California Institute of Technology, president-elect of the American Chemical Society, on his return from an eight-months visit to Europe, during which he served as George Eastman Professor at Oxford University. The professor warned America of the necessity of keeping up an adequate supply of trained scientists, and of the problems which arose once a deficiency had been allowed to occur. He cited the case of Great Britain where, he said, a vigorous programme involving grants to universities for support and instruction of basic research, and the provision of scholarships and fellowships for university students and research workers, was seriously handicapped by the shortage of professors and teachers and the limited amount of laboratory space available in the universities.

* * *

In order to break the alleged monopoly of the aluminium industry, the U.S. Department of Justice has asked the Federal Court in New York City to issue an order directing Alcoa (the Aluminium Company of America) to dispose of some of its plants and properties. Mr. Roy A. Hunt, president of Alcoa, claims that the action of the Justice Department is purely political, and asserts that the monopolistic charges are unfounded. Competitors, he states, now have control of quite half the U.S. aluminium ingot market, and enjoy a competitive advantage by the use of plants built by Alcoa for the government without fee or profit, and turned over to them on very liberal terms. The present suit is the outcome of an anti-trust suit against Alcoa begun in 1937.

* * *

One of the biggest oil refinery projects in recent times has been set in motion at Woodbridge, New Jersey, by the acceptance of the Shell Oil Company's offer to purchase for $270,000 280 acres in the municipal area. Here will be constructed an oil refinery at a cost of some $100 million, which will probably operate in 1953. It will employ more than 2000 and its pay roll may require about $8000 million annually.

* * *

The action of the British Ministry of Supply in raising the prices of a number of metals because of increased costs of imported supplies, is not expected to change materially the price levels of similar metals in the United States. Executives in non-ferrous metals industries there—recorded the *New York Times* on October 2—stated that American buyers may, however, be handicapped in purchasing these supplies from foreign sources. The prices paid by American buyers for lead, for example, are considerably higher in world markets than in domestic markets. It is said that lead has been imported into the United States at 23½ cents, compared with a domestic price of 18½ cents. The British, these executives are reported as saying, have been paying only 19¾ cents for their competitive purchases, and have subsidised the use of the metal in England, selling it for 15 cents.

TECHNICAL NEWS AND SERVICES

A wide variety of interest and some entertainment are to be found in No. 8 (July issue) of the "Standards Review" published by the British Standards Institution. Contents range from articles on the importance of measurements and basis of their standardisation, protection of iron and steel and design for plastics to such subjects as spring mattresses and the significance of dotted lines, dealt with in lighter vein. There are also news items from all parts of the world. The frontispiece is a portrait of Lord McGowan, president of the institution.

* * *

A new, quick-setting, urea resin adhesive for the woodworking industry that sets in 10 minutes at room temperature (75° F.), has been developed in the research laboratory of the Timber Engineering Co. Known as Colpres 10, the glue is of a type that requires no special equipment in its use. The glue is stated to be water resistant, non-staining and of great strength. It is a two part adhesive, consisting of a dry powder formaldehyde resin which is mixed with water and applied to one of the wood surfaces to be glued, and a liquid hardener which is applied to the other surface.

* * *

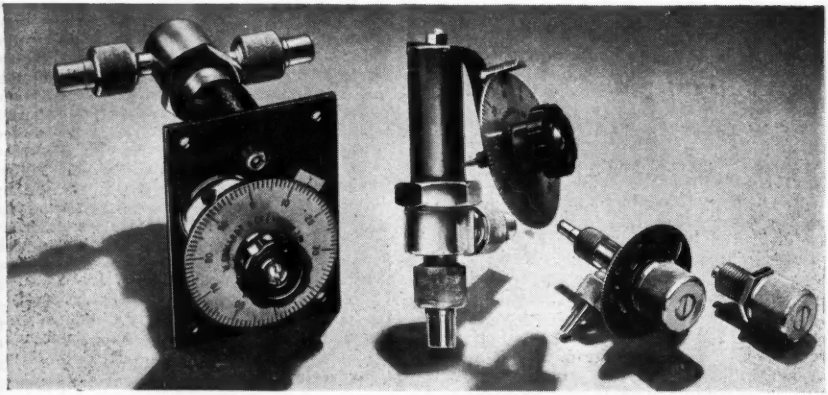
The Osaka Foreign Trade Institute, Osaka, Japan, has issued a trade catalogue of about 200 pages listing the names and addresses of various categories of industries in that area. It contains a classified commodity index covering various classes of chemical products and metals. There is also a Japanese-English vocabulary for company names and addresses.

* * *

A new pamphlet on further development in fuel oil additives has been released by E. F. Houghton & Co., of W. Lehigh Avenue, Philadelphia, Pa. The new product is described as a rapid means of removing sludge from industrial fuel oil systems.

Fine Control Valves for High Vacua

Illustrated here are some of the fine control needle valves for high-vacuum control recently produced by W. Edwards & Co. (London), Ltd., Lower Sydenham, S.E.26. Left to right: Type L.B.2, in which a counter mechanism enables the needle to be re-set to any opening. Type L.B.1, a bellows sealed needle valve having a lever reduction movement, also flow control per degree of dial revolution. Type W.S.1, compact vacuum-sealed needle valve with elastomer-type spindle seal; the stainless steel needle, positively operated by a fine screw-thread control, is not permitted to rotate. Type R.S.1, is a small chromium-plated brass air admittance or "vacuum break" valve; positive vacuum isolation is given by the rubber-nosed spindle.



A CHEMIST'S BOOKSHELF

Tables of Physical and Chemical Constants. By G. W. C. Kaye and T. H. Laby. 10th Edition. London: Longmans, Green & Co., Ltd. 1948. Pp. 194. 21s. net.

For many years these tables have filled the need for a comprehensive and up-to-date set of English physical and chemical tables in a volume of moderate size. The authors, both late professors of the University of Melbourne, have revised in this tenth edition the scope of their work from the previous editions, which reach back as far as 1911, and important new tables have been incorporated. The contents of the book are devoted to general physics and astronomy: heat; sound; light, including spectroscopy; electricity and magnetism; X-rays; atoms and ions; chemistry and geology; isotopes; moments of inertia; and mathematical tables. This volume is calculated to be extremely useful to students as well as to industrial workers. The comprehensive index gives good guidance through the numerous sections of the work, and in the case of many of the divisions there is given a brief résumé containing references to books and original papers which may profitably be consulted.

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Applied Chemistry Reports. Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1947. Vol. XXXII, pp. 518.

The working chemist, almost overwhelmed by the deluge of published matter, yet a little anxious lest something of value should have been overlooked, gratefully looks forward to the publication of these annual reports, as a selective review of important work in a complete year. The 1947 volume has been printed in smaller type than the last, enabling the field to be reviewed in a tightly packed 518 pages. Subject matter is divided into 29 sections, embracing a wealth of material presented, of which it is possible here to comment upon only a few items of current interest. The small body of information that has been published on energy from atomic fission and on the separation of isotopes is readily summarised in a few lines. In the sphere of jet and gas turbine engines there are brief digests of work on gas combustion problems and of the developments in special alloys. The latter need to show strong resistance to creep, be corrosion-resistant and stable at high temperatures. Not only have 18/8 chromium-nickel steels been modified, but entirely new cobalt-chromium and cobalt-chromium-nickel alloys have been successfully applied. The review by Dr. Foxwell on gas and tar products discusses the impact on these industries of impending nationalisation. "Opportunity for technical development on a national . . . basis which the technologists have long sought has now been provided." Output of gas from carbonisation in the gas industry rose from 194,518 million cubic feet in 1921 to 307,092 in 1945. Including gas bought from coke ovens and water gas, the total distributed by the gas industry in 1945 was 433,106. Underground gasification of coal is considered unsuitable in general for British conditions. Important advances have been made in the chemical protection of crops from insect attack, points out Dr. Martin in his article "Pest Control in Agriculture." Synthesis, sphere of action, toxicity and the limitations of DDT have all received attention. A one-step method of synthesis of DDT (1:1:1 trichloro-2:2-di-p-chlorophenylethane) uses chloral hydrate, chlorobenzene and chlorosulphonic acid. It is considered harmless to operators applying it for insecticidal purposes and fears of its action on bees have not been substantiated. Dr. Southgate, director of water pollution research, contributes the article on "Sanitation and Water Purification." The disposal of many trade waste waters has occupied the attention of his laboratory and those of others. A notable success was the development of an aerobic process for retting flax. Obviating all former difficulties in wast water disposal, the new process is a recirculating one, producing no waste water. These annual reports become indispensable. As immediate reading matter, they provide general surveys of fields of individual interest by leading workers. As reference works, they have the advantage over abstracts and formal indexes of discussing compounds and processes parallel or closely related to those being reviewed.

Home News Items

E.C.A. Grants.—Purchases from the United States approved by the Economic Co-operation Administration recently announced include zinc ingots for 2.72 million dollars and treated hardwood by Italy for 1.5 million dollars.

New Copper Tubing Factory.—Site levelling is expected to begin at once on the copper tubing factory of I.C.I., Ltd., which is to be erected on the Liverpool Corporation's Kirkby Trading Estate. It is anticipated that the completion of one section will take more than a year.

Argentine Rail Contract.—United Steel Companies, Ltd., has confirmed that an order for 1 million tons of steel rails and fishplates has been placed with British steel railmakers by the Argentine Government through the purchasing commission in London. The contract is valued at about £6 million and delivery will be over six years.

Works Visit.—Members of the Institute of Metals, who have been holding their autumn meeting at Cambridge, recently visited the works of the Manganese Bronze & Brass Co., Ltd., Ipswich, and inspected the tool shop, laboratories and dispatch department, as well as the extension mills, rolling mill foundries and forge.

Mobile Oxygen Equipment.—The expansion to Scotland of the Oxygenaire organisation under the name Oxygenaire (Scotland), Ltd., with a depot in Deepdene Road, Westerton, Glasgow, is stated to be the first stage in the creation of a series of depots in other Scottish towns for the operation of the 24-hour service system featured by this firm.

Chemical Duties Changed.—The Treasury has made an order exempting aldehyde butyric (butyl aldehyde), normal, and methylene chloride from Key Industry Duty, for the period beginning with September 30, 1948, and ending with December 31, 1948. "The Safeguarding of Industries Exemption (No. 8) Order, 1948," is published as Statutory Instruments, 1948, No. 2169. (H.M.S.O., 1d.).

Textile Education.—More candidates than ever before have this year secured National Certificates in Textiles, announces the Textile Institute, which is jointly responsible with the Ministry of Education for the National Certificate scheme. Of 131 entrants for the ordinary National Certificate, 109 passed, and of 85 entrants for the higher National Certificate, 82 were successful. Fifteen higher National Certificate winners obtained distinctions.

Change of Address.—The name of Tinsley (Industrial Instruments), Ltd., whose removal to North Circular Road, West Twyford, N.W.10, was recorded last week, was inadvertently reproduced incorrectly.

Scottish Pottery Plan.—The Scottish Council (Development and Industry) is to establish a sub-committee to consider the revival and development in Scotland of the pottery industry, at one time important, which has declined in recent years to negligible proportions.

Scottish Factory's New Premises.—British Products (Sanmex), Ltd., chemical, soap and disinfectant manufacturers, whose premises at St. Andrew's Square, Glasgow, were burned down some months ago, have now moved into a new home at Dalmarnock Road, Rutherglen.

Oil Refinery for Britain.—A project to build a £20 million oil refinery near Millbrook is under consideration by Trinidad Leaseholds, Ltd., who have approached the south-east Cornwall Water Board as to the possibility of supplying water. The refinery would require nearly one million gallons of water a day.

U.K. Coal Output.—Coal production in Britain last week showed a slight decrease, the total of 3,894,600 tons comparing with 4,116,000 tons in the previous week. Mr. Gaitskell, Minister of Fuel, at a management conference on fuel efficiency in Birmingham on Tuesday, appealed to industrialists for further economies in coal. Where possible he asked them to use low-grade fuel.

New Scottish Paint Factory.—A new factory for the manufacture of cellulose paints is to be built on a site of about three acres in Glasgow. The corporation sub-committee on sites and buildings, has agreed to grant a lease of the site to A. H. Robinsons and Sons, paint merchants and manufacturers of Govan, Glasgow. The firm, meanwhile, proposes to erect temporary factory buildings.

Coal Economy.—A weekly saving of 150 tons of coal has been achieved by William Fulton & Sons, Ltd., dyers and finishers, Glenfield, Paisley. The works, employing 450, have been chosen as an example of what the Scottish Fuel Efficiency committee is doing. Mr. J. Dalton, general manager, stated that the saving represented 25 per cent of the firm's fuel consumption and was obtained with a second-hand boiler.

Personal

New Appointments in Eire

OFFICERS elected by the annual general meeting of the Irish Chemical Association held in Dublin were: President, PROF. T. S. WHEELER; vice-president, D. CROWLEY; hon. secretary, G. F. O'SULLIVAN; hon. treasurer, J. G. BELTON. Council: MESSRS. V. C. BARRY, T. G. BRADY; PROF. W. COCKER, PROF. T. DILLON, W. V. GRIFFITHS; MISS M. MACNEILL, N. V. NOWLAN, and F. T. RILEY.

PROFESSOR GEORGE JAYNE, director of the Institute of Cellulose Chemistry at Darmstadt, is now on a visit to Australia, where he will advise on the manufactures of rayon textile and paper. He hopes to assist in overcoming some of the difficulties encountered in making paper from short-fibred eucalyptus woods.

The presentation of awards to members by the retiring-president, MR. ARTHUR WALKER, and induction of the president, MR. HASWELL ALDER, are the main items at the meeting of the North of England Institute of Mining and Mechanical Engineers being held to-day (Saturday). Awards are as follow: G. C. Greenwell bronze medals to DR. WILFRED TAYLOR and MR. C. R. L. HALL, George May and Institute prizes to: T. A. BOND, G. D. EDWARDS, WILLIAM HAZON, DONALD HINDSON, C. D. HORNSBY, G. W. F. LECK, W. D. TONKINSON, and J. S. WOOD.

The Dunlop Rubber Company announces the appointment of MR. MAURICE F. COOP, as secretary to the company in succession to Sir Charles Tennyson, C.M.G., whose resignation was recorded last week. Mr. Coop, who is 41, joined Dunlop in 1936 and has been head of the company's legal department.

The governors of the Royal Technical College, Glasgow, have appointed DR. FREDERIC M. BRUCE, to the Chair of Electrical Engineering, in succession to PROF. S. PARKER SMITH, who retired recently.

SIR ELLIS HUNTER has been appointed chairman of Dorman Long & Company in succession to LORD GREENWOOD.

Gassing Mishap in Fife Colliery.—Three lives were lost and one man was taken to hospital as a result of a gassing accident at Lockhead colliery, near the town of Wemyss. The men were at work to seal off a pocket of gas in the Dysart seam of the colliery when they were overcome.

Interrupted Studies

Higher Education in the Army

THE subject of the continuation studies under the Army Educational Scheme of young men called up for National Service in the Army who, having already been accepted and registered as students either at a university or with a professional body, find their academic or professional preparation interrupted for a period of at least twelve months, is dealt with in a helpful letter from the Director of Army Education received recently by the Institution of Chemical Engineers, of which the following excerpt gives the salient points:—

"We are agreed that the first essential is to have full particulars regarding each man in this category as soon as he is enlisted so that his individual educational needs may be known and met as early as possible in his service. To this end it would seem desirable that any man called up for National Service in the Army who is registered as a student at an institution of higher education, should be provided, by that institution, with a pro-forma showing the course of studies he is taking, his immediate objective, and, if possible, a list of text-books which he has been recommended to read.

"With this authoritative information the educational staff of the man's unit would be able to make the necessary arrangement for adequate continuation studies with the minimum of delay. It would be for the War Office to ensure that students were made aware of the suggested machinery at the time of their call-up. It was thought that the universities and the professional bodies might be prepared to assist in this matter by providing the required information on application being made by the students."

Purchasing Officers' Report

A year of record activity was reported by the retiring chairman, Mr. Thomas F. Turner (chief purchasing agent, English Electric Co., Ltd.) in his address at the annual conference of the Purchasing Officers' Association, Cheltenham. The main object of the association, which now has nineteen branches and over 1600 members in England, Scotland, and Wales, is to raise the status of the purchasing officer. Students and junior members are helped by the education scheme, while an appointments register is maintained at the association's head office in London. Mr. F. O. Ashmore (the Calico Printers' Association, Ltd., Manchester) was elected president for 1948-1949.

Overseas News Items

Resistant Wood Coating. — A coating newly developed in the U.S.A.—Carbokote—for the protection of wood in many forms, including liquid containers, floors, etc., is stated to resist temperatures up to 325° F., to give complete adhesion under all ordinary conditions and to be suitable for application by brush or spray.

Franco-American Mining Company. — Mining operations have been started by Compagnie Franco-Americaine des Metaux, recently formed with French and U.S. capital to develop iron ore possibilities in French Guinea. Estimates issued by the company indicate a potential yearly output of 3 million tons.

£2.75 m. Phosphate Deal.—The Australian and New Zealand governments are to acquire the rights of the large phosphate deposits on Christmas island at the end of this year for the sum of £2,750,00. Christmas Island, which forms part of the Straits Settlements, has an area of about 60 sq. miles; phosphate is the only export and in 1940 amounted to 238,006 tons.

Chilean Copper Products. — A decree issued this week by the Ministry of the Treasury, Santiago, Chile, authorises the sale of Chilean copper products to countries unable to pay in dollars. It is expected that the new decree will especially favour Argentina, Spain, Italy, and France, among the dollar-short nations which will be allowed to pay for purchases in their own currencies, under certain conditions.

New Spanish Companies.—The following chemical and pharmaceutical establishments have recently been registered in Spain: Primma, S.A., Barcelona, intends to manufacture 560 kg. of glycero-phosphates and 375 kg. of other phosphates per month: Aplicaciones del Acetileno, S.A., Barcelona, to produce 100 kg. of acetylene derivatives per day: a number of companies intend to manufacture relatively small quantities of plastics and plastic goods.

Use of German Synthetic Fuel Plant.—The management of the Gelsenkirchen Synthetic Fuel Co. has recently concluded an agreement with the German Vacuum Oil Co. and the Standard Esso Co. according to which the latter are to make use of the Gelsenkirchen plant for the manufacture of synthetic fuel. A similar agreement has been concluded between the German subsidiary of the Shell group and the Union of Rhenanian Lignite Works, Wesseling, concerning the use of the plant at Wesseling.

Trinidad Oil Proposals.—The Petroleum Technologist and Inspector of Mines in Trinidad has stated that local oil companies plan to spend some $5 million per annum during the next three years in exploration and development. Work is at present confined to the south end of the island, and wells will probably be drilled considerably deeper than in the past.

New Irak Oil Source?—Bagdad newspapers, quoting an official source on October 3, reported that the " Basrah Oil Company have discovered rich petroleum wells in one of the areas of Basrah hitherto unprospected, in a concession granted to a British oil firm." The Basrah Oil Company obtained an exclusive concession to explore the oil resources in vast areas of southern Irak in 1938.

Manganese from West Australia.—A message from Perth, West Australia, from the correspondent of *The Financial Times*, states that a local syndicate which has reopened the old Horseshoe manganese deposits, 90 miles east of Meekatharra, has contracted to ship 1000 tons of ore each month to month. American buyers are said to be seeking contracts for 100,000 tons annually, but the State railways cannot at the moment handle this quantity of ore.

Ammonia Compressors for Durban.—The *Board of Trade Journal* records that the United Kingdom Trade Commissioner at Durban has forwarded a copy of contract inquiry No. E.2183, issued by the City of Durban for the supply of two 60-ton ammonia compressors, complete with motors, switchgear, starters and a liquid receiver, for the municipal abattoir. The closing date for receipt of tenders is November 19. The specification is available for inspection at the Export Promotion Department (Room 1073), Thames House (North), Millbank, London, S.W.1. Reference 41272/48 should be quoted.

Italian Oil Refinery Record.—Pre-war and post-war records were broken by " Aquila," Soc. per Azioni Tecnico Industriale, Trieste, with a crude oil input of over 54,000 tons during the 31 days of August, 1948. The refinery, which was almost completely destroyed by bombing during the war, has been rebuilt, and since restarting operations in June, 1947, the distillation plant has processed an aggregate of 500,000 tons of crude oil. Another record was recently established at " Aquila " when the South African tanker *President Brand* (17,220 tons) discharged a cargo of 15,000 tons of naphtha from Arabia in 37 hours 30 minutes.

Next Week's Events

MONDAY, OCTOBER 11

Institute of Metals (Scottish Section), 39 Elmbank Crescent, Glasgow. 6.30 p.m. D. S. Burwood: "Technique of Extraction Processes."

TUESDAY, OCTOBER 12

Institute of Metals (South Wales Section), Royal Institution, Victoria Street, Swansea. 6.30 p.m. D. W. Hopkins: chairman's address.

Scientific Film Association, Royal Institution of Great Britain, 21 Albemarle Street, W.1. One-day conference: "The Film in Scientific Research," opening by Sir Robert Watson-Watt. 10 a.m. to 9.30 p.m.

Royal Society of Tropical Medicine, Manson House, 26 Portland Place, W.1, 6.30 p.m. First meeting of the session: Dr. D. L. C. Jackson and Dr. W. S. Reid of the Distillers Company, Ltd.: "The Degradation of Vinyl Polymers."

Society of Chemical Industry and British American Research, Ltd., Gleneagles Hotel, Perthshire. "High Vacuum Convention." (2 days.)

Manchester Federation of Scientific Societies. Society of Instrument Technology, Institution of Electronics, College of Technology, Manchester. 7.30 p.m. Dr. Edmundsen: "Electronic Development in Instrumentation."

WEDNESDAY, OCTOBER 13

Society of Chemical Industry (microbiological and nutrition panels), Food Group, 56 Victoria Street, London, S.W.1. 6.15 p.m. Dr. E. F. Gale: "The Role of Vitamins and Metals as Co-enzymes in Bacterial Metabolism."

Royal Institute of Chemistry (London and South-eastern Counties section), I.C.I. Paints, Wexham Road, Slough. 2.30 p.m. G. R. Cornish: "Methods of Determining Molecular Weights of Polymers." 5 p.m. C. H. Young: "Performance of Paint Films."

Institute of Welding (North London branch), Enfield Technical College. 7.30 p.m. A. Baines: "Thermit Welding."

THURSDAY, OCTOBER 14

Chemical Society, Burlington House, Piccadilly, W.1. 7 p.m. Reading of original papers. R. D. Haworth, J. McKenna, and N. Singh: "The Constitution of Conessine"; G. Dunn, J. J. Gallagher, G. T. Newbold and F. S. Spring: "The Antibacterial Compound of Aspergillic Acid."

Oil and Colour Chemists' Association (London section), Royal Institution, Albemarle Street, W.1. 6.30 p.m. Prof. H. J. Emeléus: "The Impact of Radioactivity on Inorganic Chemistry—III. Some Applications of Radioactive Substances."

Manchester Federation of Scientific Societies. Chemical Society; Royal Institute of Chemistry; Society of Chemical Industry; Manchester University. 6.30 p.m. Prof. R. A. Morton: "Biochemistry of Vitamin A."

FRIDAY, OCTOBER 15

Royal Institute of Chemistry (London and South-eastern Counties section), Burlington House, W.1. The Geological Society. Prof. H. B. Nisbet: "Anaesthetics."

Manchester Federation of Scientific Societies. Plastics Institute, Engineers' Club, Manchester. 6.45 p.m. Chairman's address: "A Review of Thermoplastic Materials."

Society of Dyers and Colourists, Gas Department showrooms, Manchester. 6.30 p.m. Prof. W. T. Astbury: "Adventures with the Electron Microscope."

HIGH VACUUM CONVENTION

ARRANGED by British-American Research, Ltd., of Hillington North, Glasgow, and sponsored by the Society of Chemical Industry, a convention to discuss high vacuum techniques is to be held at the Gleneagles Hotel, Perthshire, on October 12 and 13. It will be under the presidency of Sir Charles Darwin, K.B.E., M.C., F.R.S., director of the National Physical Laboratory. Papers to be read include:—"Fundamental Aspects of High Vacuum Technique," by Dr. S. Dushman; "Application of High Vacua in the Paint and Plastics Industry," by Dr. J. C. Swallow and Dr. J. Gourlay; "Application of High Vacua to Dehydration," by R. S. Morse; "Application of High Vacua to the Metallurgical Industry," by R. A. Stauffer; "Application of High Vacua to Distillation of Fatty Oils," by Dr. E. W. N. Fawcett; "Application of High Vacua to Distillation," by R. S. Morse; "Developments Arising out of Experiments on Vacuum Distillation Considered as an Illustration of the Impact of One Technology on Another," by Dr. C. R. Burch; "High Vacua in Nuclear Physics and Atomic Energy," by Prof. M. L. E. Oliphant.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

STEWART PLASTICS, LTD., London, S.W. (M., 9/10/48.) September 6, charge, to Cheltenham and Gloucester Building Society, securing £6000 and further advances, charged on 45 Morrish Road, Lambeth. *£5274. September 6, 1947.

Satisfactions

CHESTERS, WOOD & CO., LTD., Keighley. (M.S., 9/10/48.) Satisfaction September 8, of charge registered January 28, 1947, to the extent of £776 10s. 4d.

JAMES BRIDGE COPPER WORKS, LTD., Walsall. (M.S., 9/10/48.) Satisfaction September 3, of debentures registered March 14, 1918 (fully).

LAFARGE ALUMINOUS CEMENT CO., LTD., London, W. (M.S., 9/10/48.) Satisfaction September 7, of debenture stock registered June 25, 1946, to the extent of £5555.

MONCTON COKE & CHEMICAL CO., LTD. (M.S., 9/10/48.) Satisfaction September 9, of debentures registered February 13, 1946, to the extent of £13,332.

Company News

Wm. Neill & Son (St. Helens), Ltd., achieved record production of steelwork and plant for chemical and other factories in the year ended in March. £10,000 is transferred to general reserve and a surplus of £31,568 is carried forward. The proposed dividend of 6d. per share, less tax, was approved.

New Companies Registered

Banbury Paint and Drysaltery Company, Ltd. (459,358).—Private company. Capital £2500. To carry on the business of manufacturers of and dealers in paints, oils, colours, etc. Directors: J. K. Parkinson, A. E. Weir, W. Weir. Reg. office: 29 Horse Fair, Banbury, Oxon.

Dyequick Products Ltd. (459,370).—Private company. Capital £1000. Manufacturers of and dealers in dyes, chemicals, drugs, etc. Directors: B. Krenin and Mrs. R. Krenin. Reg. office: 122 Newgate Street, E.C.1.

Parekem Industrial Chemicals Ltd. (459,400).—Private company. Capital £500. Manufacturers, exporters and importers of chemicals, salts, acids, alkalis, drugs, etc., and to adopt an agreement with R. E. Roberts for the purchase of a trademark, "Parekem Rust Remover." Directors: R. E. Roberts, T. Scott. Reg. office: 172 Upper Brook Street, Manchester.

A. Saalfeld & Co., Ltd. (459,190).—Private company. Registered September 27. Capital £10,000. Distillers, distillers' chemists and merchants, dealers in essential oils, colours, gums, etc. Directors: Fdk. H. Saville, Chas. Kemp, Doris K. Saville. Reg. office: Shield Works, Royds Street, Stockport Road, Manchester, 13.

Turkdean Development Ltd. (459,343).—Private company. Capital £100. Manufacturers, importers and exporters of chemicals and insecticides. Directors: A. Monteith, W. Leyland, G. V. Howard, R. G. Pilkington and N. D. Wingrove. Solicitors: Greenwood Milne & Lyall, 32 Ely Place, E.C.1.

Chemical and Allied Stocks and Shares

STOCK markets were more active earlier this week, with prices in most sections showing gains on balance in response to more hopeful City views of the international situation. It is being assumed that the bulk of the £43 million payment due to holders of Argentine rail ordinary and preference stocks will be reinvested in British Funds. Consols and Treasury 2½ per cents have been favoured, also 3½ per cent War Loan, while among the nationalisation stocks, Transport 3 per cent were up to 99¾, the best level since dealings started last january.

Imperial Chemical provided the best feature among leading industrials, and were favoured because the company combines industrial and rearmament activities. The old shares advanced further to 46s. 9d., while the new shares (now 20s. paid) were up to the peak level of 25s. 9d. The new will become fully paid at the end of this month when their final call of 20s. 6d. per share is due. They are now being strongly favoured, because they are a cheaper purchase than the old shares, still being free of stamp. Take-over prospects now that the National Coal Board wants coke-ovens

has continued to draw attention to British Benzol around 86s. 6d., while Benzol and By-Products have been active around 11s. 6d., and Thorncliffe Coal Rose to 16s.

Monsanto Chemicals were 58s. 9d., Albright & Wilson 28s. 9d., Amber Chemical 2s. shares 9s. 6d., Fisons have been steady at 59s., with Laporte Chemicals 5s. units 20s. 7½d. Burt Boulton & Haywood were quoted at 25s. 7½d., and Turner & Newall were 76s. United Molasses firmed up to 47s. 4½d., units of the Distillers Co. were 27s. 4½d., British Plaster Board 24s. 9d., but Goodlass Wall receded to 34s. 3d. following the increase in the price of lead. De La Rue rallied to 39s., Dunlop Rubber to 74s. 4½d., and Lever & Unilever to 49s. 9d. In other directions, Amalgamated Metal improved to 20s.

Iron and steels became more prominent, it being pointed out that yields are attractive in most cases, while the industry will remain very active partly owing to rearmament; and despite the threat of nationalisation, the market believes "compensation" would have to be above current market prices. Colvilles advanced further to 37s., United Steel were 29s. 3d., Guest Keen 48s. 7½d., Stewart & Lloyds rose to 55s 6d., and Dorman Long to 32s. Babcock & Wilcox moved up to 71s., and in anticipation of good financial results, T. W. Ward rose to 61s. In other directions Staveley remained prominent, rising further to 89s. 3d. on the market view that a part repayment of capital is probable, following the capital return by Doncaster Amalgamated Collieries, in which Staveley has a large interest.

Elsewhere, Borax Consolidated, after their recent reaction, have rallied to 60s., British Oxygen were 98s. 1½d., and in other directions, British Glues & Chemicals 4s. ordinary eased to 20s. British Aluminium were firm at 47s. 6d., the market assuming that expansion of business and new developments may require more capital, which may be provided by an issue of £1.5 million 3 per cent debentures. Qualcast shares rose 1s. to 63s. 6d. following the full results and chairman's annual statement. Boots Drug 5s. ordinary have been steady at 52s. with Beechams deferred 18s. 3d., Sangers 30s. 3d., and Griffiths Hughes 30s.

British Industrial Plastics 2s. shares were maintained at 6s. 10½d. British Xylonite changed hands around £5, and General Refractories 10s. shares were 21s. 10½d. Oils were uncertain, with Anglo-Iranian at £8, Shell 75s. 7½d., and Trinidad Leaseholds 5s. units 30s. Ultramar Oil slumped further to 42s. 6d., awaiting news of how additional capital is to be raised.

British Chemical Prices

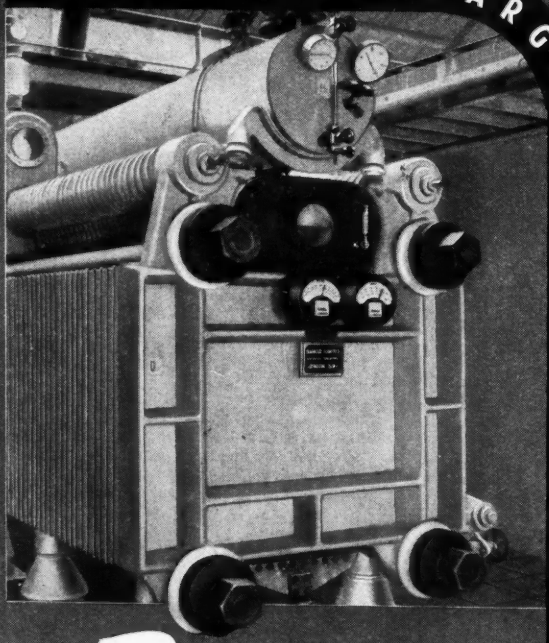
Market Reports

ACTIVE trading conditions are again reported for the leading industrial chemicals and the call from home consumers for deliveries under existing contracts has been on a good scale. The export demand remains persistent and the recent Board of Trade returns show a very satisfactory overseas business in a fairly wide range of chemicals and allied products. The chief price change of the week has been the advance in the convention quotations for red and white lead, due to the increase in the controlled price of pig lead. Dry red lead at £127 per ton is £21 per ton dearer and white lead at £136 per ton is £19 10s. per ton dearer. The advances apply as from October 1. A reduction of 6s. per cwt. on the price of tartaric acid has been reported. A steady buying interest has been in evidence on the coal-tar products market, with cresylic acid and crude carbolic acid as well as creosote oil in appreciable request from home users. The overall demand for shipment has been moderately good and a fair amount of fresh inquiry is reported.

MANCHESTER.—Generally firm price conditions continue to be reported on the Manchester chemical market, although actual upward movements during the past week have been confined to non-ferrous metal compounds, which have been affected by the advance in the metals. On the home market makers have experienced a steady flow of contract delivery specifications against contracts, and good quantities of caustic soda, soda ash and other alkali products, as well as the magnesia and ammonia compounds, are being taken up. A fair amount of home trade replacement buying has also been reported. Shipping business seems to have been maintained at around its recent level. A steady demand for the general run of tar products has been noted.

GLASGOW.—Fairly active conditions have continued in the Scottish chemical market during the week. The demand for solvents and coal-tar products in general has been higher during the past week than for some time. It has not been found possible to meet all orders. The demand for bleaching powder has also been more active, and available supplies have again not been sufficient for prompt delivery. In the export market, conditions have also been fairly active and a few orders have again been booked. In general, the position is fairly satisfactory.

FROM THE LARGEST TO THE SMALLEST



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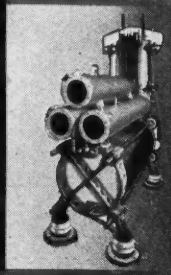

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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Manufacture of substituted benzhydryl ethers.—E. P. Newton. (Parke, Davis & Co.) Jan. 29, 1946. 607,258.

Synthetic resinous adhesives.—Wingfoot Corporation. Oct. 10, 1945. 607,268.

Production of benzene hexochloride and of insecticides containing it.—I.C.I., Ltd., L. J. Burrage, and C. Williams. Jan. 30, 1946. 607,326.

Production of viscous aqeous solutions of proteins.—I.C.I., Ltd., J. E. L. Thomas, and D. Traill. Jan. 30, 1946. 607,327.

Acid wool dyestuffs of the anthraquinone series.—I.C.I., Ltd., F. Lodge, and W. E. Stephen. Jan. 30, 1946. 607,328.

Treatment of polymeric methyl methacrylate.—I.C.I., Ltd. Jan. 30, 1945. 607,329.

Light-sensitive diazotype material.—Chemische Fabriek L. Van Der Grinten July 29, 1942. 607,334.

Process for the manufacture of α-chloro-α-aceto-γ butyrolactone.—Roche Products, Ltd. (F. Hoffmann-La Roche & Co., A.G.) Jan. 31, 1946. 607,366.

Process for the manufacture of a thiophane derivative.—Roche Products, Ltd. Feb. 2, 1945. 607,367.

Concentration of cobalt-nickel ores.—American Cyanamid Co. Feb. 6, 1945. 607,385.

Stable dispersions of secondary aromatic amines.—E. I. Du Pont de Nemours & Co., B. M. Sturgis, and A. A. Baum. Feb. 1, 1946. 607,391.

Corrosion inhibiting compositions.—Shell Development Co. March 13, 1945. 607,013.

Manufacture of halogenated carboxylic acids.—Boots Pure Drug Co., Ltd., W. Howieson, H. A. Stevenson, and W. F. Short. March 13, 1946. 607,113.

Polysiloxane resin enamels.—British Thomson-Houston Co., Ltd. May 1, 1945. 607,022.

Manufacture of resinous condensation products.—Beck, Koller & Co. (England), Ltd., E. A. Bevan, and R. S. Robinson. June 4, 1946. 607,031.

Magnesium alloys.—J. Stone & Co., Ltd., A. J. Murphy, and R. J. M. Payne. July 11, 1944. 607,588.

Continuous process for manufacturing motor fuel hydrocarbons.—Texaco Development Corporation. March 29, 1940. 607,593.

Production of 1-(3, 4-dihydroxyphenyl)-2-amino-1-butanol and intermediates thereof.—Winthrop Chemical Co., Inc. March 16, 1944. 607,772.

Crystalline alumina and method and apparatus for making the same.—Norton Co. May 8, 1944. 607,689.

Process for the manufacture of phosphatic fertilisers and the products thereof.—Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny & Cirey. Jan. 22, 1942. 607,602.

Manufacture of indigoid dyestuffs.—Ciba, Ltd. Oct. 13, 1944. (Cognate Application 26597/45.) 607,608.

Production of emulsions of polymerised esters of acrylic and methacrylic acids.—Vinyl Products, Ltd., J. E. O. Mayne, H. Reichard and H. Warson. Oct. 12 1945. 607,704.

Dis-azo-dyes.—Technicolor Motion Picture Corporation. April 7, 1945. (Samples furnished.) 607,792.

Manufacture of biguanide derivatives.—Imperial Chemical Industries, Ltd., A. D. Ainley, F. H. S. Curd, and F. L. Rose. Dec. 31, 1945. 607,720.

Continuous process for neutralising fatty acids.—Procter & Gamble Co. Feb. 23, 1945. 607,721.

Handling of particulate materials.—Imperial Chemical Industries, Ltd., M. H. M. Arnold and R. J. Young. Jan. 18, 1946. (Cognate Application 35881/46.) 607,723.

Alkylsilicone sols and gels.—British Thomson-Houston Co., Ltd. Feb. 10 1945. 607,426.

Organo-silica sols and gels.—British Thomson-Houston Co., Ltd. Feb. 10, 1945. 607,427.

Process for the manufacture of zinc peroxide.—B. Laporte, Ltd., W. S. Wood, and G. Clennett. Feb. 4, 1946. 607,445.

Horizontal coal carbonising beds.—Payne & Flood, Ltd., L. A. Payne, and J. Flood. Feb. 5, 1946. 607,459.

Process for the preparation of acid anthraquinone dyestuffs.—Sandoz, Ltd. Feb. 12, 1945. 607,467.

Lubricants.—E. I. Du Pont de Nemours & Co. Feb. 6, 1945. 607,488.

Heat-hardenable phenolic resins.—Bakelite, Ltd. Feb. 7, 1945. 607,635.

Methods of producing of vinyl fluoride polymers.—British Thomson-Houston Co., Ltd. Feb. 13, 1945. 607,499.

Piezo-electric apparatus.—British Thomson-Houston Co., Ltd. Feb. 13, 1945. 607,500

Process for the production of para-oxyphenyl-arsinic acid.—J. A. Pascual. Feb. 7, 1945. 607,489.

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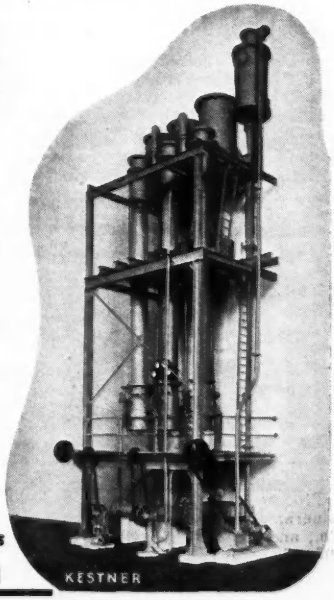

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Process for obtaining 4-4¹-dioxi-3-3¹-diamino - arseno-benzene - sodium - methanesulphoxylate.—J. A. Pascual. Feb. 7, 1945. 607,490.

Manufacture of derivatives of β. β-dimethyl-cysteine and intermediates for the manufacture thereof.—Therapeutic Research Corporation of Great Britain, Ltd., Sir I. M. Heilbron, A. H. Cook, and J. R. Catch. Feb. 7, 1946. 607,539.

Process for the electrolytic reduction of poly-hydroxy-carboxylic acid lactones.—Roche Products, Ltd. (F. Hoffman-La Roche & Co., A.-G.). Feb. 7, 1946. 607,540.

Process for the manufacture of artificial sponges from viscose and products resulting therefrom.—Soc. De La Viscose Francaise. June 16, 1943. 607,573.

Polymerisation process and products thereof. —E. I. Du Pont de Nemours & Co. Feb. 9, 1945. 607,734.

Polymerisation of monoethylenic compounds.—E. I. Du Pont de Nemours & Co. Feb. 9, 1945. 607,735.

Magnetic analysis of a magnetic body.—Magnetic Analysis Corporation. June 9, 1945. 607,753.

Process for the manufacture of moulded synthetic resin articles.—N. V. De Bataafsche Petroleum Maatschappij. June 16, 1944. 607,755.

Process for the manufacture of moulded synthetic resin articles.—N. V. De Bataafsche Petroleum Maatschappij. Sept. 4, 1944. 607,756.

Process for the preparation of lubricants.—N. V. De Bataafsche Petroleum Maatschappij. Aug. 22, 1945. 607,757.

Preparation of organosilicon compounds.—Albright & Wilson, Ltd., and A. G. Taylor. Feb. 12, 1946. 607,811.

Method of manufacturing viscose rayon.—Comptoir Des Textiles Artificiels. Nov. 8, 1944. 607,816.

Process for producing diisopropyl salicylic acid and salts thereof.—N. V. Bataafsche Petroleum Maatschappij. Feb. 25, 1944. 607,831.

Diacylamidobiphenylenedioxydialkyl - carboxylic acids and process of preparation.—General Aniline & Film Corporation. Feb. 7, 1945. 607,762.

Preparation of amides from acyclically unsaturated compounds.—Rohm & Haas Co. Aug. 18, 1945. 607,765.

Manufacture of hydrocarbon oil compositions.—Standard Oil Development Co. Jan. 29, 1941. 608,214.

Process for the solvent treatment of mineral oils.—Standard Oil Development Co., and Rohm & Haas Co. Aug. 21, 1940. 607,945.

Processes for the solvent extraction of di olefins from hydrocarbon mixtures.—Standard Oil Development Co., and Rohm & Haas Co. Nov. 22, 1940. 607,946; Nov. 22, 1940. 607,947.

Process for the solvent extraction of naphthenes from hydrocarbon mixtures.—Standard Oil Development Co., and Rohm & Haas Co. Dec. 7, 1940. 607,948.

Process for the solvent extraction of aromatics from hydrocarbon mixtures.—Standard Oil Development Co., and Rohm & Haas Co. Dec. 7, 1940. 607,949.

Manufacture of anthraquinone derivatives. —Soc. of Chemical Industry in Basle. Jan. 13, 1944. 607,955.

Manufacture of water-soluble anthraquinone derivatives.—Soc. of Chemical Industry in Basle. Jan. 14, 1944. 607,956.

Treatment of latex and like aqueous dispersions of rubber.—J. F. Boiry. Feb. 26, 1944. 607,958.

Device for the dispersion of a gaseous fluid in a liquid.—H. L. Bendel, and F. Jonneret. Aug. 21, 1945. 608,136.

Method of and apparatus for drying hygroscopic plastic material containing sugar.—A. H. Stevens. (Food Concentrates, Inc.) Aug. 22, 1945. 608,137.

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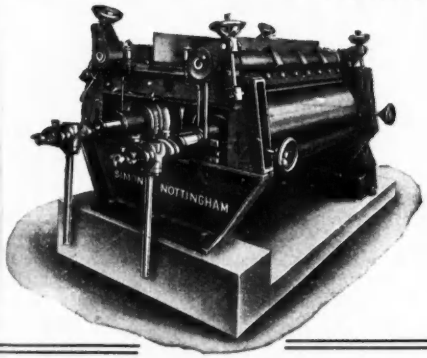

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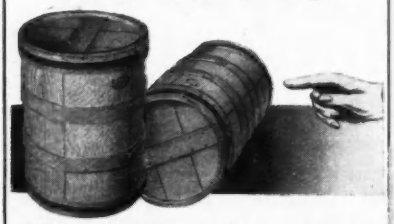

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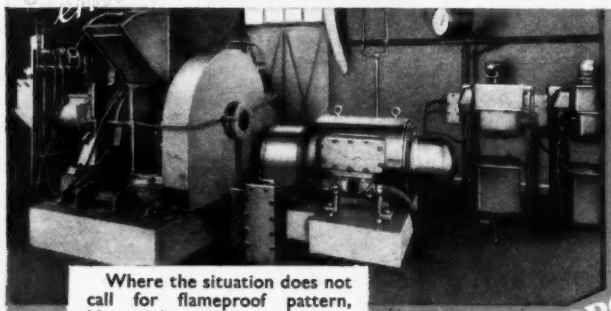

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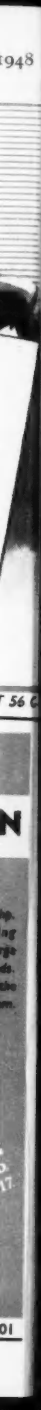
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